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CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE SOUTH PLAINFIELD, NEW JERSEY

OPERABLE UNIT 4: BOUND BROOK

TECHNICAL MEMORANDUM

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1. INTRODUCTION

1.1. Purpose

The Cornell-Dubilier Electronics (CDE) Superfund Site (Site) is located at 333 Hamilton Boulevard, South Plainfield, Middlesex County, New Jersey. The Site has been divided into four Operable Units (OUs) by the U.S. Environmental Protection Agency (USEPA). Operable Unit 1 (OU1) addresses residential, commercial, and municipal properties in the vicinity of the former CDE facility. On September 30, 2003, the USEPA signed a Record of Decision (ROD) to address OU1. Operable Unit 2 (OU2) addresses contaminated soils and buildings at the former CDE facility. On September 30, 2004, the USEPA signed a ROD to address OU2. Operable Unit 3 (OU3) addresses contaminated groundwater and Operable Unit 4 (OU4) addresses the Bound Brook.

The former CDE facility (OU2), recently known as the Hamilton Industrial Park, consists of approximately 26 acres. CDE manufactured electronic components including, in particular, capacitors from 1936 to 1962. Polychlorinated biphenyls (PCBs) and chlorinated organic solvents were used in the manufacturing process. CDE apparently disposed of PCB-contaminated materials and other hazardous substances directly on the OU2 soils. These activities evidently led to widespread chemical contamination at the former CDE facility, as well as migration of contaminants to areas nearby. Elevated levels of volatile organic compounds (VOCs) and PCBs have been found in soils at the former CDE facility, in soils at adjacent properties (residential, commercial, and municipal), in groundwater beneath the former CDE facility, and in the sediments of Bound Brook.

This Technical Memorandum (Tech Memo) addresses scoping and planning activities necessary to perform the Remedial Investigation/Feasibility Study (RI/FS) for OU4. These scoping and planning activities, as described in the August 7, 2008 Scope of Work prepared by the United States Army Corps of Engineers, Kansas City District (USACE-KCD), and further modified by direction from USEPA provided at the October 15, 2008 project kick-off meeting and the January 22, 2009 scoping meeting, include:

- Summarizing and evaluating the available OU4 data collected to date.
- Proposing specific investigations, studies, analytical activities, and modeling required to complete the OU4 RI/FS.
- Identifying potentially applicable or relevant and appropriate requirements (ARARs) for OU4.

Activities proposed in this memorandum will be further developed during RI planning document preparation. Data collection proposed in this Tech Memo, and as approved by USACE-KCD and USEPA, will be incorporated into the RI Work Plan for OU4 in accordance with the requirements of the National Contingency Plan (NCP) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA).

1.2. Technical Memorandum Document Review

Preparation of this Tech Memo was based upon a review and consideration of data, information, and discussions related to the following:

- Data Evaluation Report for Cornell-Dubilier Electronics Superfund Site. South Plainfield, Middlesex County, New Jersey (FWENC, 2001a).
- Remedial Investigation Report for OU1, Cornell-Dubilier Electronics Superfund Site. South Plainfield, Middlesex County, New Jersey (FWENC, 2001b).
- Final Report, Ecological Evaluation for the Cornell Dubilier Electronics Site (USEPA, 1999).
- Soil and Sediment Sampling and Analysis Summary Report (USEPA, 1998) and Addendum No. 1 (USEPA, 1999).

- Floodplain Soil/Sediment Sampling and Analysis Summary Report (Weston, 2000).
- Preliminary Conceptual Site Model for Operable Unit 4 (Tetra Tech EC Inc., May 2006).
- Sampling Report, Cornell-Dubilier Electronics Site for Sample Dates December 2007 and January 2008 (USEPA, 2008).
- Wildlife Species Investigation of the Bound Brook Ecosystem, South Plainfield, New Jersey (Stantec, 2008).
- OU4 project kick-off meeting with the USACE-KCD and the USEPA on October 15, 2008.
- OU4 scoping meeting with USACE-KCD, USEPA, and other stakeholder agencies on January 22, 2009.

2. CORNELL-DUBILIER ELECTRONICS SITE HISTORY

2.1. SITE LOCATION

The former CDE facility is located in the Borough of South Plainfield, northern Middlesex County, in the central portion of New Jersey. According to the 2006 Census estimate, South Plainfield has a population of approximately 22,795 people with a total land area of approximately 8.4 square miles (city-data.com).

The former CDE facility includes a fenced, 26-acre facility that is bounded on the northeast by Bound Brook and the former Lehigh Valley Railroad, Perth Amboy Branch (presently Conrail); on the southeast by Bound Brook and a property used by the South Plainfield Department of Public Works; on the southwest, across Spicer Avenue, by single family residential properties; and to the northwest, across Hamilton Boulevard, by mixed residential and commercial properties. The surrounding area represents an urban environment with principally commercial and light industrial use to the northeast and east, principally residential development to the south and directly north, and mixed residential and commercial properties to the west. The property contained numerous subdivided buildings, numbered 1 through 18; demolition of these buildings was completed in 2008. A topographic map showing the location of the former CDE facility is included as Figure 2-1 and a plan view of the facility, showing the former buildings, is included as Figure 2-2.

The OU4 investigation area is described in detail in Section 3.1 of this Tech Memo.

2.2. SITE HISTORY

The history of the former CDE facility and previous investigations/enforcement activities that have occurred at the former CDE facility are summarized below. Previous investigations included groundwater sampling, subsurface soil sampling, sediment sampling, building surface sampling, soil gas sampling, indoor air sampling, and hydrogeological studies.

The Spicer Manufacturing Company operated a manufacturing plant on the OU2 property from 1912 to 1929 (referred to hereafter as the South Plainfield plant). The Spicer Manufacturing Company manufactured universal joints and drive shafts, clutches, drop forgings, sheet metal stampings, screw products, and coil springs for the automobile industry. The South Plainfield plant included a machine shop, box shop, lumber shop, scrap shop, heat treating building, transformer platform, forge shop, shear shed, boiler room, acid pickle building, and die sinking shop. A chemical laboratory for the analysis of steel was added in 1917. Most of the major structures were erected by 1918; Figure 2-2 shows the locations of the former buildings, which were demolished from 2006 to 2008. In 1929, the Spicer Manufacturing Company ceased operations at the South Plainfield plant, which then consisted of approximately 210,000 square feet of buildings (FWENC, 2002).

On April 1, 1929, the Spicer Manufacturing Corporation transferred all remaining assets of the South Plainfield plant to a new subsidiary, the Plainfield Manufacturing Corporation. The Plainfield Manufacturing Corporation apparently served as a holding company for the South Plainfield plant and property, portions of which it soon was beginning to lease to other companies. While documentary evidence exists indicating that Spicer intended to maintain a large and active business via the Plainfield Manufacturing Company, it apparently did not come to pass, likely due to the 1929 stock market crash and the coming depression. Regardless of the intentions of the company, by the end of 1929, company headquarters and practically all of its manufacturing equipment had been moved from South Plainfield to the new Toledo, Ohio facility. It is possible that the South Plainfield plant was largely inactive until 1936, when it was leased to CDE.

CDE operated at what is now the Hamilton Industrial Park from 1936 to 1962, manufacturing electronic components including capacitors. It has been reported that the company also tested transformer oils for an unknown period of time. PCBs and chlorinated organic degreasing solvents were used in the manufacturing process, and it has been alleged that during CDE's period of operation, the company disposed of PCB-contaminated materials and other hazardous substances at the facility. A former employee has claimed the rear of the OU2 property was saturated with transformer oils

and capacitors were also buried behind the former CDE facility during the same time period (FWENC, 2002). Since CDE's departure in 1962, the Hamilton Industrial Park has been operated as a rental property consisting of commercial and light industrial tenants. Since the early 1960s, numerous tenants have occupied the complex. In 2007, the USEPA began implementing the OU2 ROD with the relocation of the tenants at the industrial park and demolition of the 18 buildings. Relocation of the tenants was completed in mid-2007 and demolition of buildings was completed in May 2008.

2.2.1. Previous Investigations/Enforcement Actions at OU1 through OU3

Environmental conditions at the former CDE facility were first investigated by the New Jersey Department of Environmental Protection (NJDEP) in 1986. Subsequent sampling by NJDEP and USEPA detected the presence of elevated concentrations of PCBs, VOCs, and inorganic chemicals at the Site. In 1997, the USEPA conducted a preliminary investigation of Bound Brook (refer to Section 2.2.2) and also collected surface soil and interior dust samples from nearby residential and commercial properties. These investigations led to fish consumption advisories for Bound Brook and its tributaries. As a result of these sampling activities, the Site was added to the National Priority List (NPL) in July 1998. In addition, the USEPA ordered several removal actions to be performed:

- In March 1997, USEPA ordered the owner of the facility property, D.S.C. of Newark Enterprises, Inc. (DSC), to perform a removal action to mitigate risks associated with contaminated soil and surface water runoff from the former CDE facility.
- In 1998, USEPA initiated a removal action to address PCBs in interior dust at houses to the west and southwest of the former CDE facility.
- In 1998, USEPA ordered CDE and Dana Corporation to implement a removal action to address PCBs in soils at six residential properties located to the west and southwest of the former CDE facility. This removal action was conducted by CDE from 1998 to 1999.

- In 1999, USEPA ordered CDE and Dana Corporation to implement a removal action to address PCBs in soils at seven residential properties located to the west and southwest of the former CDE facility. This removal action was conducted from 1999 to 2000.
- In April 2000, USEPA entered into an Administrative Order on Consent (AOC) with DSC requiring the removal of PCB-contaminated soil from one additional property located on Spicer Avenue. DSC agreed to perform the work required under the AOC, but subsequently did not do so. In August 2004, USEPA began the removal of PCB-contaminated soil from this property; the work was completed in September 2004.

In 2000, a RI was conducted by Foster Wheeler, Inc. that included the collection of soil, sediment, and building surface samples, as well as the installation and sampling of 12 shallow bedrock monitoring wells (FWENC, 2001b). The USEPA subsequently divided the Site into four OUs as described in Section 1.1.

In June 2003, USEPA proposed a remedy for OU1, and the ROD was issued on September 30, 2003. The selected remedy included the removal of approximately 2,100 cubic yards of contaminated soils from neighboring properties, as well as indoor dust remediation where PCB-contaminated dust was identified. Additional sampling (soil and dust) was also proposed to determine if further remediation was required.

In August 2001, the RI Report for OU2 was issued. The FS for OU2 was issued in April 2004, and the ROD was issued in September 2004. The remedy specified in the ROD included:

- Excavation of an estimated 107,000 cubic yards of contaminated soil containing PCBs at concentrations greater than 500 parts per million (ppm) and contaminated soils that exceed New Jersey's Impact to Groundwater Soil Cleanup Criteria (IGWSCC) for contaminants other than PCBs.
- On-Site treatment of excavated soils amenable to treatment by Low Temperature Thermal Desorption (LTTD), followed by backfilling of excavated areas with treated soils.

- Transportation of contaminated soil and debris not suitable for LTTD treatment to an off-Site facility for disposal, with treatment as necessary.
- Excavation of an estimated 7,500 cubic yards of contaminated soil and debris from the capacitor disposal areas (CDAs) and transportation for disposal off-site, with treatment as necessary.
- Installation of a multi-layer cap or hardscape.
- Installation of engineering controls.
- Property restoration.
- Implementation of institutional controls.

In January 2008, eight deep bedrock wells were installed by USEPA to assess the hydraulic properties of the fractured bedrock and water quality of the bedrock groundwater up- and down-gradient of the former CDE facility. The wells were completed to an average depth of 150 feet below ground surface (bgs). Following completion of the well installation, groundwater samples were collected for VOCs from multiple depths using packer sampling techniques, targeting discrete water-bearing zones within each well. Additionally, groundwater samples were collected from the 12 existing shallow bedrock monitoring wells located at the former CDE facility.

Investigations related to Bound Brook are summarized in the sections that follow.

2.2.2. Ecological Risk Assessment

In June and August 1997, USEPA collected soil, sediment, surface water, and biota samples (small mammals, crayfish, forage fish, and edible fish) along Bound Brook to support an ecological risk assessment (ERA). Sampling locations were designed to characterize exposure in terrestrial and aquatic areas near Spring Lake, New Market Pond, Bound Brook, and Cedar Brook and are shown on Figure 2-2a through Figure 2-2e. The sampling locations were organized according to numbered reach designations (Reach 1 through Reach 9), which are identified on the figures.

Samples were analyzed for VOCs, semi-volatile organic compounds (SVOCs), pesticides, PCB Aroclors, and metals. Results of the ecological risk assessment are presented in the *Final Report: Ecological Evaluation for the Cornell-Dubilier Electronics*

Site (USEPA, 1999). The ecological risk assessment concluded that the structure and function of the stream ecosystem within Bound Brook and its corridor was at risk from chemical contamination and that other sources (in addition to the former CDE facility) were likely contributing to the risk.

2.2.3. 1997 Soil and Sediment Sampling

USEPA collected additional soil and sediment samples along Bound Brook from August to November 1997. Surface and subsurface sediment and soil samples were collected to characterize 2.4 miles of streambed and bank areas upstream and downstream of the former CDE facility, which are shown on Figure 2-3a through Figure 2-3d. The sampling program included 100 transects across Bound Brook, spaced at varying intervals from 50 feet to 100 feet to 200 feet distant from each other. Along each transect, five sampling locations were established: one sediment sampling location positioned in the middle of the stream and two soil sampling locations established on either side of the brook (5 feet and 10 feet upland from the water's edge). At each location, two discrete depth intervals were sampled to characterize the surface sediment (0-6 inches) and subsurface sediment (generally 18-24 inches below the sediment surface). Samples were analyzed for PCB Aroclors; these data are presented in the *Soil and Sediment Sampling and Analysis Summary Report* (Weston, 1998).

2.2.4. 1999 Floodplain Soil and Sediment Sampling

In June 1999, USEPA collected Bound Brook sediment samples downstream of Spring Lake (in Reach 5 and Reach 6) and floodplain soil samples from four areas as shown on Figure 2-4. The floodplain sampling areas were designated Area 1 "Veteran's Memorial Park," Area 2 "North Side of Cedar Brook" (between Lowden Avenue and Oakmoor Avenue), Area 3 "North Side of Bound Brook" (near Fred Allen Drive), and Area 4 "South of New Market Avenue and East of Highland Avenue." Samples were analyzed for PCB Aroclors; these data are presented in the *Floodplain Soil/Sediment Sampling and Analysis Summary Report* (Weston, 2000).

2.2.5. 2007-08 Soil and Sediment Sampling

In April 2007, buried capacitor debris became exposed on the banks of Bound Brook due to erosion downstream of the twin culverts and adjacent to the former CDE

facility. An additional sediment sampling event was conducted in 2007-08 to re-characterize Reaches 1 through 4 of Bound Brook previously sampled in 1997 and shown on Figure 2-5.[1] Samples were analyzed for PCB Aroclors; these data are presented in the *USEPA Sampling Report* (USEPA, 2008). Malcolm Pirnie understands that a statistical analysis performed by USEPA indicated that the mean PCB concentration increased from 1997 to 2007-08 in the vicinity of the former CDE facility, but the maximum PCB concentration detected remained comparable for both sampling events.

3. OU4 DATA EVALUATION

3.1. INVESTIGATION AREA

Bound Brook is a major tributary of Green Brook (a tributary of the Raritan River) in Middlesex County, New Jersey and is classified as freshwater, non-tidal (see Figure 3-1a). The Bound Brook headwater is located in Edison Township, New Jersey and flows westerly through South Plainfield Borough into Piscataway Township, where the water is dammed to form New Market Pond. The brook then flows through Middlesex Borough to the confluence with Green Brook as shown on Figure 3-1b. The Bound Brook sub-basin drains an estimated 48 square miles (Tetra Tech EC, Inc., 2006).

This Tech Memo identifies an OU4 Investigation Area (hereafter referred to as OU4) that combines the Bound Brook channel with the 100-year floodplain, using floodplain boundaries as developed by the Federal Emergency Management Agency (FEMA); as shown on Figure 3-1b. The downstream extent of OU4 is the confluence of Bound Brook with Green Brook. The upstream extent of OU4 is defined by the location of samples BD-5 and BD-6 collected in 2007 from the adjacent Woodbrook Road Dump Superfund Site (TRC, October 2007).[1] OU4 encompasses approximately 1.83 square miles (1,171 acres) and extends approximately 7.32 miles from the confluence of Bound Brook and Green Brook to the northwestern limit of the sampling associated with the Woodbrook Road Dump Site. OU4 also includes Cedar Brook and three unnamed tributaries to Bound Brook. The northern extent of OU4 on Cedar Brook is Cedar Brook Avenue (South Plainfield, New Jersey).[2] While OU4 includes the 100-year flood plain of three unnamed tributaries and the 100-year floodplain at the confluence of Bound Brook and Green Brook, the scope of the investigation of the unnamed tributaries, their floodplains, and the floodplain proximal to Green Brook (dashed line in Figure 3-1b) will

[1] OU4 does not include the Wood Brook Road Dump Superfund Site (NJSFW0204260), which is an inactive and illegal dumping area that operated during the 1940s and 1950s. Household and industrial wastes were accepted until the dump was shut down by the State of New Jersey in 1958.
[2] A dam at the western end of Spring Lake controls the discharge flow of Cedar Brook into Bound Brook.

be contingent on decision criteria to be described in the OU4 remedial investigation planning documents.

3.2. PRELIMINARY DATA EVALUATION

A preliminary statistical and spatial evaluation of existing data was conducted to identify data gaps and provide input to the recommendations for RI data collection efforts. This section describes the data sources, evaluation methods, and findings.

3.2.1. Electronic Data Source

The preliminary data evaluation utilized data from prior investigations of OU4 that were compiled in electronic format for USEPA (TetraTech, 2007). The compiled data were provided as a Geographic Information System (GIS) deliverable on CD and were originally reported in the documents listed below:

- Final Report, Ecological Evaluation for the Cornell Dubilier Electronics Site (USEPA, 1999).
- Soil and Sediment Sampling and Analysis Summary Report (USEPA, 1998) and Addendum No. 1 (USEPA, 1999).
- Floodplain Soil/Sediment Sampling and Analysis Summary Report (Weston, 2000).

Additional data not included in the reports listed above but provided on the CD consisted of results from soil samples collected along Fred Allen Drive and Lowden Avenue (refer to Figure 3-3). The compiled electronic data consisted of selected sample matrices (sediment only), parameters, and results from the prior investigations; for example, metals data provided electronically consisted of five parameters: arsenic, chromium, lead, mercury, and zinc.

The GIS was updated with new base maps and data layers. A River Mile (RM) system was added with the origin at the confluence of Green Brook and Bound Brook. The plotted locations of sampling points were checked against hardcopy maps provided with the above-listed reports for consistency. Although not all data were provided electronically, the number of sampling locations in the GIS matched the sampling locations identified in the reports. A complete electronic copy of the available data and GIS data layers used in this preliminary data comparison is attached to this Tech Memo as Appendix A.

3.2.2. Surface Sediment Data Evaluation

Surface sediment metal results (arsenic, chromium, lead, mercury, and zinc) were provided from 1997 samples. To evaluate potential trends along Bound Brook, surface sediment metal concentrations were plotted versus river mile and are shown on Figure 3-4a through Figure 3-4e. Samples collected from Cedar Brook are plotted at RM5.75 (the confluence of Cedar Brook and Bound Brook). In general, reported 1997 surface sediment metal concentrations in Bound Brook were higher than the "lowest effects level" (LEL) established by NJDEP for freshwater ecosystems (NJDEP, 1998); however, concentrations did not exceed the "severe effects level." Note that the majority of the mercury data were reported as zero and plotted below the LEL line.

Statistical trend analyses (Mann Kendall and linear regression) of the 1997 surface sediment metals concentrations suggest that the metals concentrations increase (*e.g.*, positive slope) downstream and to the west of the former CDE facility; however, the large scatter in the metals data and the low linear regression coefficient suggest a low significance to this trend. To understand the potential trend in the metals data, further statistical analyses may be conducted during preparation of the planning documents, including calculating the error on the Mann Kendall analysis, constructing a correlation matrix, and normalizing metals data to reduce scatter associated with sediment heterogeneity.

Surface sediment Total PCB concentrations were available for two sampling events: 1997 and 1999 (2007-08 data were not yet available in electronic format). To evaluate potential trends along Bound Brook, Total PCB surface sediment concentrations were plotted versus river mile and are shown on Figure 3-5. Samples collected from Cedar Brook are plotted at RM5.75 (the confluence of Cedar Brook and Bound Brook) and samples collected in Green Brook are plotted at RM0.

In general, elevated Total PCB concentrations were detected above RM4.5 with concentrations as high as approximately 40 mg/kg detected in 1997 and approximately 190 mg/kg detected in 1999. Statistical trend analyses were conducted on the entire dataset; however, the large group of non-detected Total PCB concentrations above RM6.5 (corresponding to Transect A through Transect L in 1997) biased the trend analyses.

The 1997 Total PCB data were then re-plotted on a spatial map provided as Figure 3-6. Total PCB concentrations higher than 1 mg/kg were observed near the former CDE facility, suggesting a Total PCB source at that location. Lower levels of Total PCB were observed directly upstream and downstream of the former CDE facility; however, limited physical parameters (*e.g.*, grain size distribution and total organic carbon) restrict the interpretation of these data. Bound Brook is known to be 'flashy' and to respond quickly to storm flows during rain events, which could cause bank erosion and sediment transport downstream. Elevated Total PCB concentrations were also observed between RM5 and RM6. Sampling locations in New Market Pond were generally limited to the western, downstream end of the pond, preventing a robust evaluation of spatial trends within New Market Pond.

3.2.3. Surface Soil Data Evaluation

Surface soil metals concentrations were provided from upland areas sampled in 1999 and 2000 and from the stream banks (RM4 to RM7) sampled in 1997. Surface soil concentrations for arsenic, chromium, lead, mercury, and zinc are shown on Figures 3-7a through Figure 3-7e, respectively. Sampling locations along the stream bank were plotted according to their corresponding river mile, whereas upland sample groups were plotted at one river mile chosen to represent the approximate location of the entire sample group. These upland sampling areas include:

- Area 1 "Veteran's Memorial Park" is located at the confluence of Cedar Brook and Bound Brook (Figure 2-4) and includes walking paths, tennis courts, and athletic fields. Sampling data from Area 1 plot at RM6.55 as a Bound Brook symbol on Figures 3-7a through Figure 3-7e.
- Area 2 "North Side of Cedar Brook" (between Lowden Avenue and Oakmoor Avenue) is located on the northern bank of Cedar Brook in a wooded area adjacent to a residential area (Figure 2-4). Sampling data from Area 2 plot at RM5.75 as a Cedar Brook symbol on Figures 3-7a through Figure 3-7e.
- Area 3 "North Side of Bound Brook" (near Fred Allen Drive) is located on the northern bank of Bound Brook between RM5.35 and RM5.55 in a wooded area adjacent to a residential area (Figure 2-4). Sampling data from Area 3

plot at RM5.45 as a Bound Brook symbol on Figures 3-7a through Figure 3-7e.

- Area 4 "South of New Market Avenue and East of Highland Avenue" is located near an unnamed tributary of Bound Brook adjacent to railroad tracks and includes a paved parking area. Sampling data from Area 4 plot at RM5.55 as an unnamed tributary symbol on Figures 3-7a through Figure 3-7e.
- Residential and non-residential soil cleanup criteria are also provided on the plots for reference (NJDEP, 1999).

Surface soil metals concentrations in each upland area vary by more than a factor of three; however, in 1997, the average surface soil concentrations for arsenic, chromium, mercury, and zinc were less than the NJDEP residential and non-residential direct contact criteria. (Note that while the average soil concentration was less than the direct contact criteria, some exceedences were observed for arsenic and zinc.) The average lead concentration exceeded the residential direct contact criterion in Area 1 and Area 4, and the average lead concentration in Area 3 (along the northern banks of Bound Brook) exceeded the non-residential direct contact criterion.

Surface soil Total PCB concentrations in these upland areas are shown on Figure 3-8. Similar to the metal concentrations, the Total PCB concentrations also varied. In 1997, the average surface soil Total PCB concentrations for Area 2 exceeded the NJDEP residential direct contact criteria, and the average surface soil Total PCB concentrations in Area 1 and Area 3 exceeded the NJDEP non-residential direct contact criteria.

The elevated Total PCB surface soil concentrations observed in Area 3 (along the banks of Bound Brook) suggest that the banks and floodplain of Bound Brook may be impacted by transport of contaminated solids from the former CDE facility. Surface soil Total PCB concentrations detected along the banks of Bound Brook between RM4.5 and RM6.5 in 1997 exceeded the NJDEP non-residential direct contact criterion as shown on Figure 3-8. The Total PCB concentration profile for surface soils on the banks is similar to the profile for surface sediments in Bound Brook, as noted on Figure 3-9.

No correlation was found when comparing surface soil Total PCB concentrations and surface sediment Total PCB concentrations along individual sampling transects.

3.2.4. Other Potential Sources of Off-site Contamination

As part of the Preliminary Conceptual Site Model for OU4 (TetraTech, 2006), a limited file review for known contaminated sites within one quarter mile of Bound Brook and the former CDE facility was conducted. A summary of environmental concerns for each site was developed and a copy is provided in Attachment A. Additional contaminated sites within three miles of the former CDE facility were identified through an internet search of the USEPA and NJDEP GIS portals. The locations of these sites are shown on Figure 3-10. An additional file review may be conducted as part of OU4 RI/FS to evaluate whether these sites could have contributed chlorinated solvents, PCBs, or other contaminants to Bound Brook.

4. OU4 DATA EVALUATION FOR RISK ASSESSMENT

This section summarizes evaluation of the available OU4 data for use in the RI human health and ecological risk assessments. The evaluation is based on the current understanding of environmental setting, known and suspected contaminants, fate and transport mechanisms, and potential receptors in OU4.

4.1. HUMAN HEALTH RISK ASSESSMENT

A Human Health Conceptual Site Model (CSM) for OU4 is provided as Table 4-1. Based on this model, an initial appraisal of the usability of existing data and future data needs is presented in the sections that follow.

4.1.1. Bound Brook Sediment Data

The 2007/2008 sediment data for Reaches 1 through 4 can be utilized in the human health risk assessment (HHRA), pending the results of USEPA Las Vegas' comparative statistical evaluation of the 1998/1999 and 2007/2008 datasets. The 1998/1999 sediment data for Reaches 5 through 9 can also be used, pending the results of confirmatory sampling and comparative statistical evaluation of the two datasets.

Contaminants of potential concern (COPC) concentrations in the 0-6 inch samples will be used to evaluate the current scenario. The higher of the COPC concentrations in the 0-6 inch sample and the corresponding deeper samples will be used to evaluate the future scenario, to allow for scour and other environmental processes that could expose deeper COPC concentrations.

4.1.2. Bound Brook Bank Soil/Sediment Data

Generally, the available brook bank soil/sediment data can be used to support the HHRA. The 2007/2008 bank soil/sediment data for Reaches 1 through 4 will be used, pending the results of USEPA Las Vegas' comparative statistical evaluation of the 1998/1999 and 2007/2008 datasets. The 1998/1999 bank soil/sediment data for

Reaches 5 through 9 will also be used, pending the results of confirmatory sampling and comparative statistical evaluation of the two datasets.

COPC concentrations in the 0-6 inch samples will be used to evaluate the current scenario. The higher of the COPC concentrations in the 0-6 inch sample and the corresponding deeper samples will be used to evaluate the future scenario, to allow for erosion and other environmental processes that could expose deeper COPC concentrations.

4.1.3. Bound Brook Surface Water Data

Surface water data were collected in June/August 1997 to support USEPA's 1999 Ecological Evaluation and in December 2007/January 2008 in Reaches 1 through 4. The June/August 1997 data will not be utilized in support of the preliminary HHRA. The 2007/2008 data are from filtered surface water samples analyzed for PCBs only.

4.1.4. Floodplain Soil Data

The brook bank soil/sediment samples were collected from locations both north and south of the brook, at distances of 5 feet and 10 feet from the water's edge. With few exceptions, Aroclor 1254 concentrations in the 2007/2008 brook bank soil/sediment samples from Reach 4 were greater than the USEPA Regional Screening Levels for industrial (740 ug/kg) and/or residential (220 ug/kg) soil. Based on the topographic base map and floodplain boundaries map for OU-4 (TetraTech, 2006), it appears that there are residences and/or commercial/industrial facilities located in the floodplain along Reach 4. Therefore, the existing data are not sufficient to fully evaluate the potential for human exposure in the floodplain further removed from the brook along Reach 4.

4.1.5. Biota Data

The fish/invertebrate tissue data collected by the USEPA Removal Branch in September 2008 for PCB analysis are expected to be adequate to support the HHRA, pending receipt and review of the analytical data.

Fish/invertebrate tissue concentrations of other bioaccumulative chemicals will be estimated from the surface water and/or sediment data.

4.2. ECOLOGICAL RISK ASSESSMENT

A preliminary ecological conceptual site exposure model (CSEM), provided as Table 4-2, serves as the basis for selecting preliminary assessment and measurement endpoints. Identification of preliminary assessment and measurement endpoints is used to better determine additional data needs for the ERA.

4.2.1. Preliminary Identification of Assessment Endpoints

Assessment endpoints are the explicit expression of an environmental value that is to be protected. The following list of preliminary assessment endpoints may be modified as the project progresses in order to meet the objectives of the ERA.

Ecosystem-Based Assessment Endpoint:

Protection of the overall structure and function of the stream and stream corridor, including floodplain and wetlands.

Community- and Population-Based Assessment Endpoints:

1. Protection and maintenance of survival, growth, and reproduction of benthic invertebrate community to a degree on par with similar habitat in reference area(s).
2. Protection and maintenance of the survival, growth, and reproduction of fish in Bound Brook.
3. Protection and maintenance of the survival, growth, and reproduction of semi-aquatic bird and mammal populations that inhabit/utilize Bound Brook.
4. Protection and maintenance of the survival, growth, and reproduction of terrestrial bird and mammal populations that inhabit/utilize Bound Brook.

4.2.2. Preliminary Identification of Measurement Endpoints

Measurement endpoints are measurable characteristics that are related to the environmental value identified in the assessment endpoint. In some cases, assessment endpoints will be evaluated using multiple lines of evidence. Overall, the measured chemical concentrations in surface water, sediment, floodplain soil and biota will be used as measurement endpoints when compared with measures of toxicity. Measured

chemical concentrations will also be used as the basis of food chain accumulation models for representative species of the feeding guilds identified below. The environmental media for which measured data will be utilized as measurement endpoints and as input to the food chain accumulation models are also listed below.

Ecosystem-Based Measurement Endpoint:

Measured chemical concentrations in surface water from OU4 will be compared to ecological screening levels (ESLs) for surface water protective of aquatic life. Evaluation of the overall structure and function of the stream and stream corridor will also be made through evaluation of the community- and population-based assessment endpoints.

Community- and Population-Based Measurement Endpoints:

1. To evaluate assessment endpoint #1:
    - Measured chemical concentrations in sediment from Bound Brook, from both existing investigations and the proposed RI investigation, will be compared to ESLs for sediment protective of benthic organisms.
    - Crayfish whole body residue data from existing investigations and aquatic oligochaete tissue data from proposed RI bioaccumulation testing will be compared to critical body residue values from the literature.
    - Sediment toxicity testing will be conducted as part of this RI. Results will be compared to sediment toxicity testing conducted in 1997 (USEPA, 1999).
2. To evaluate assessment endpoint #2:
    - Fish whole body residue data from USEPA investigations will be compared to critical body residue values from the literature.
3. To evaluate assessment endpoint #3:
    - Food chain accumulation modeling will be conducted for representative herbivorous, insectivorous, piscivorous, and omnivorous birds and mammals.

- Modeled daily doses of chemicals of concern for the representative species will be compared to avian and mammalian toxicity reference values (TRVs).
- Measured chemical concentrations in surface water and sediment, from both existing investigations and the proposed RI investigation, and in biota (USEPA fish and crayfish tissue residue data and aquatic oligochaete tissue residue data from the proposed RI bioaccumulation testing) will be used as input to the food chain accumulation modeling.

4. To evaluate assessment endpoint #4:
   - Food chain accumulation modeling will be conducted for representative herbivorous, insectivorous, omnivorous, and carnivorous birds and mammals.
   - Measured chemical concentrations in surface water and floodplain soil, both from existing investigations and the proposed RI investigation, and biota (existing white-footed mouse tissue residue data and terrestrial oligochaete tissue residue data from proposed RI bioaccumulation testing) will be used as input to the food chain accumulation modeling.
   - Modeled daily doses of chemicals of concern for representative species will be compared to avian and mammalian TRVs.

4.2.3. Usability of Existing Data for ERA

4.2.3.1. Bound Brook Sediment and Bank Sediment/Soil Data

As indicated for the HHRA, the existing brook sediment and bank sediment/soil data are also generally adequate to support the ERA. The 0-6 inch sampling interval for brook sediment is likely representative of the biologically active zone. Existing sediment data (0-6 inches) from the 2007/2008 dataset for Reaches 1 through 4 will be used, pending the results of USEPA Las Vegas' comparative statistical evaluation of the 1998/1999 and 2007/2008 datasets. Sediment data (0-6 inches) from the 1998/1999 sediment dataset will be used for Reaches 5 through 9, pending the results of confirmatory sampling and comparative statistical evaluation of the two datasets.

4.2.3.2. Bound Brook Surface Water Data

The existing surface water data collected in June/August 1997 are not suitable for use in the ERA. The 2007/2008 filtered water samples analyzed for PCBs will be evaluated further in the ERA.

4.2.3.3. Floodplain Soil Data

Based on the topographic base map and floodplain boundaries map for OU4, there are undeveloped floodplain areas along Reaches 6 and 8; therefore, existing floodplain soil data are not sufficient to fully evaluate the potential for ecological exposure in the floodplain areas of OU4 further removed from Reach 4.

5. RECOMMENDATIONS FOR REMEDIAL INVESTIGATION DATA COLLECTION

5.1. Preliminary RI/FS Study Questions

As stated in the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA, 1988), the identification of data needs is the most important part of the RI/FS scoping process. This section identifies data needs and study questions that will be used to develop OU4-specific data quality objectives (DQOs) during the preparation of RI work plan documents and to thereby guide the design of the RI field investigations.

The RI/FS Guidance states that in general, the RI/FS must obtain data to define source areas of contamination, the potential pathways of migration, and the potential receptors and associated exposure pathways as necessary to quantify risk, perform the FS, and support other USEPA objectives (USEPA, 1988a).

A detailed group of Site Characterization Process objectives is included in the Contaminated Sediment Remediation Guidance for Hazardous Waste Sites (USEPA, 2005), and is presented below:

1. Identify and quantify the contaminants present in sediment, surface water, biota, flood plain soils, and in some cases, groundwater.
2. Understand the vertical and horizontal distribution of contaminants within the sediment and flood plains.
3. Identify the sources of historical contamination and quantify any continuing sources.
4. Understand the geomorphological setting and processes (*e.g.*, resuspension, transport, deposition, weathering) affecting the stability of sediment.
5. Understand the key chemical and biological processes affecting the fate, transport, and bioavailability of contaminants. (It is proposed that key physical processes must also be understood.)

6. Identify the complete or potentially complete human and ecological exposure pathways for the contaminants.
7. Identify current and potential future human and ecological risks posed by the contaminants.
8. Collect data necessary to evaluate the potential effectiveness of natural recovery, in-situ capping, sediment removal, and promising innovative technologies.
9. Provide a baseline of data that can be used to monitor remedy effectiveness in all appropriate media (generally sediment, water and biota).

The following project quality objectives (PQOs) for future data collection in OU4 were identified in the Preliminary CSM (Tetra Tech EC, 2006):

- Collect and analyze sediment and floodplain soil samples to characterize the nature and extent of SVOC, pesticide, PCBs, and metals contamination above ARARs in OU4.
- Collect geotechnical data from sediments and floodplain soils for future screening and evaluation of remedial technologies and alternatives.
- Collect and evaluate hydraulic data in Bound Brook for characterization of fate and transport mechanisms and screening and evaluation of remedial technologies and alternatives.
- Collect and analyze surface water samples to characterize contaminant distribution.
- Maintain and update a CSM that identifies human and ecological receptors, exposure media, and exposure pathways.
- Collect data to support ecological and human health risk assessments.

Also germane to RI field investigation design and DQO development are the potential pathways listed in the Preliminary CSM (Tetra Tech EC, 2006) for the transport of contaminants into and within Bound Brook from the former CDE facility and other potential sites/sources:

- Direct disposal of contaminated materials in Bound Brook and/or adjacent areas.
- Migration of contaminants via surface runoff.
- Migration of contaminants via drainage systems.
- Migration of contaminants through groundwater to surface water via discharge to Bound Brook's transition zone.
- Migration of contaminants within surface water and sediments.
- Migration of contaminants into biota.
- Migration of contaminants into air.

The proposed investigations in Section 5.2 are intended to address the various study questions listed above.

5.2. Data Gaps and Proposed RI Data Collection

Based on a review of existing data, data gaps have been identified. This section outlines recommendations for data collection activities sufficient to meet RI reporting requirements. For a number of the proposed tasks, it is intended that the results of preceding investigations will inform the design of the sampling effort, so that information will flow from one activity into another in a phased manner. The list of investigation tasks provided below presents the proposed sequence of work and includes a description of the dependency between the tasks.

1. Geotechnical and Geophysical Surveys (Bound Brook). Sediment texture mapping from these investigations, along with available data, will be used to finalize the locations of High and Low Resolution Sediment Cores (described below).
2. High Resolution Sediment Core Sampling. The collection and analysis of High Resolution Sediment Cores will provide data useful for determining a target suite of chemical analytes for subsequent contaminant nature and extent investigations (*e.g.*, Low Resolution Core Sampling, Floodplain Soil Sampling, and Water Column Sampling).
3. Surface Water Sampling. Water column samples collected throughout OU4 during storm events will assist in the characterization of the downstream extent of

contaminated sediment transport and thereby inform the density and extent of Low Resolution Sediment Coring downstream of New Market Pond.

4. Low Resolution Sediment Core Sampling and Floodplain Soil Sampling. The collection of Low Resolution Sediment Cores and floodplain soil samples will be conducted concurrently with surface water sampling and will characterize the nature and extent of OU4 sediment and soil contamination. Some test pits may also be conducted in the floodplain to supplement USEPA test pit findings regarding buried capacitor debris areas. Initial investigations of sediment and soil contaminant concentrations and evaluation of the potential relationships between contaminant concentration, sediment and soil texture, and floodplain elevation may result in a recommendation for a second round of sediment and soil sample collection and analysis.

Each data collection task is described in additional detail in Sections 5.3 through 5.6 below. The table below associates the proposed field investigations with the RI study questions for reference.

Study Question Topics	Proposed Investigations
• Identify and quantify contaminants in sediment and soils. • Understand vertical and horizontal distribution of contaminants in sediment and floodplains. • Understand factors affecting sediment stability. • Characterize relationship between hydrophobic contaminant concentrations and sediment texture. • Characterize migration of contaminants via surface run-off. • Collect geotechnical data from sediments and floodplain soils for FS preparation. • Identify sources of contamination. • Support HHRA/ERA development. • Provide baseline data for future monitoring.	• Sediment Geotechnical and Geophysical Survey • High Resolution Coring • Low Resolution Coring • Floodplain Soil Sampling

Study Question Topics	Proposed Investigations
• Characterize migration of contaminants via surface water/sediment transport. • Identify sources of contamination. • Understand factors affecting sediment stability. • Support HHRA/ERA development. • Provide baseline data for future monitoring.	• Land Survey (Cross Sections) • Water Column Sampling • Hydrodynamic Data Collection
• Characterize connection between groundwater and surface water (transition zone).	• OU3 water level measurements. • Potential supplemental surveys.
• Support ERA development. • Characterize migration of contaminants into biota. • Provide baseline data for future monitoring.	• Sediment Toxicity Testing • Aquatic and Terrestrial Oligochaete Bioaccumulation Testing
• Support FS preparation.	• Phase 1A Cultural Resources Survey

5.3. Bound Brook Surveys

5.3.1. Streambed and Bank Elevation Surveys

Surveying is proposed on transects (located both at regular intervals and targeted to specific features) to identify stream bed and bank elevations in OU4. This data will be used to support hydrodynamic investigations, potential hydrodynamic and sediment transport modeling, and the evaluation of remedial alternatives in the FS. The potential need for an aerial topographical survey of OU4 will be discussed with USEPA.

5.3.2. Geotechnical and Geophysical Surveys (Bound Brook)

As noted in Section 7.1.1 of the Preliminary Conceptual Site Model for OU-4 (TetraTech EC, 2006), the relationship between contaminant distributions and sediment physical characteristics in OU4 is not well-understood. Mapping of sediment physical

properties and texture throughout OU4 is recommended via the following field investigations:

- Collection of sediment samples from push cores for physical characterization (visual/manual classification of texture and stratigraphy and laboratory physical properties analyses for selected samples) and sediment probing to determine thickness of sediment deposits in the Bound Brook. Sampling would be collected on regularly-spaced transects and at specific areas of interest, such as confluences with tributaries. Samples would be collected by personnel wading in the Brook with GPS location data collected for all sampling locations.
- If the water depth in New Market Pond will accommodate a survey vessel and tow fish; it is recommended that this area be characterized via a bathymetric and side scan sonar (SSS) survey, along with confirmatory push core sample collection and analysis and the collection of several geotechnical sediment cores, to map sediment texture and stratigraphy. Where such a survey is not practical, push core collection and probing will be collected from a small boat on a grid.
- Discussions are needed to determine whether this investigation should be extended into Cedar Brook, Spring Lake, and the unnamed tributaries to Bound Brook.

The objective of this investigation will be to map the locations of fine-grained sediment deposits that may be preferentially associated with higher concentrations of hydrophobic contaminants (such as PCBs) and to accumulate data to initially characterize erosional and depositional areas. This investigation will support subsequent selection of sediment coring locations for chemical analyses.

5.4. Bound Brook Sediment and Floodplain Soil Sample Collection

5.4.1. High Resolution Sediment Core Sampling

It is understood that one of USEPA's goals for OU4 is to comprehensively identify the COPCs in sediment and soils (the majority of the samples collected to date have been analyzed only for PCB Aroclors). Accordingly, the collection and analysis of

four High Resolution Sediment Cores from OU4 is proposed to characterize the presence and concentration of various contaminants in the historic sediment record.

A High Resolution Sediment Core is collected and laboratory-analyzed to investigate the depositional chronology of environmental contaminants at a contaminated sediment site. The phrase "High Resolution" refers to the processing of the retrieved sediment core into numerous, thinly-sliced segments (*i.e.*, "hockey pucks") for individual laboratory analysis. The division of the core into numerous small segments (for example, 2-4 cm in thickness) is intended to yield data on the identity and concentration of contaminants as deposited onto the sediment bed at historic intervals of several years or less.

To understand the timeframe of historic contaminant deposition, each segment from a High Resolution Sediment Core is analyzed for both target environmental contaminants and radionuclides such as Cesium-137 (^{137}Cs), Lead-210 (^{210}Pb), and Beryllium-7 (^{7}Be). For example, the origin and fate of ^{137}Cs (an anthropogenic radionuclide) in the environment generally allows the identification of the sediment layers that correspond to the depositional years 1954 and 1963 in the sediment core. Side-by-side evaluation of "downcore" plots of radionuclide and contaminant concentrations from a High Resolution Sediment Core enable the data user to construct a conceptual site model that describes the history of contaminant appearance, peak concentration, and other characteristics in the sediment record. These characterizations are useful for identifying chemicals of potential concern, understanding contaminant fate and transport, characterizing contaminant depth extent at a site, and supporting regulatory agency activities focused on documented historic discharges/releases or potentially responsible parties for environmental contamination.

High Resolution Sediment Cores can be collected using a variety of methods including vibracoring, piston coring, push coring, etc. Locating sites for the collection of High Resolution Sediment Cores is challenging, because the ideal high resolution coring site has not been disturbed by dredging, erosional events, or other natural or anthropogenic forces that could remove or mix the in-situ sediments in many decades (or at least during the historic contaminant release timeframe for the site under investigation). High Resolution Sediment Core collection sites can often be found in

backwaters, protected coves, behind structures or bridge abutments, etc. where thick deposits of contaminated sediments have accumulated continuously over time. Potential locations for High Resolution Sediment Cores in OU4 could include:

- The upstream OU4 boundary (near the Wood Brook Road Landfill Superfund Site).
- A depositional area downstream of the former CDE facility but upstream of the confluence of Bound Brook and Cedar Brook, if such an area can be found.
- Upstream of Spring Lake on Cedar Brook.
- A depositional area within New Market Pond not likely to have been disturbed by historical dredging activities.

The proposed locations for the High Resolution Sediment Core collection sites are shown on Figures 3-11a through 3-11d. It is likely that 2-3 candidate High Resolution Cores would be collected from the vicinity of each proposed location and analyzed for sediment radiochemistry (with aliquots for chemical analyses archived during radiochemical analyses) to allow identification of the best core from each location and the proposed segment size for subsequent chemical analysis.

5.4.2. Low Resolution Sediment Sampling

Low Resolution Sediment Cores are used to investigate the horizontal and vertical extent of COPCs at a contaminated sediment site. The phrase 'low resolution' refers to the processing of the collected sediment cores into segments on the order of 6-inches in length for individual laboratory analysis. Low resolution cores may be collected via vibracoring, piston coring, push coring or other methods. Sediment samples collected to date from OU4 (generally with a 0-6 inch and one deeper 6-inch segment submitted for laboratory analysis) would be considered discontinuous, Low Resolution Sediment Cores. A Low Resolution Coring program is proposed for OU4, with cores advanced by hand or vibracore while wading or from small sampling vessels, as appropriate to the sampling location. The development of the program would begin with the identification of target chemical parameters in concert with USEPA, USACE-KCD and other stakeholder agencies, based on the findings of the High Resolution Core analyses. In addition to chemical contaminants, segments collected from the Low

Resolution Cores would be analyzed for total organic carbon (TOC), grain size, and other analyses determined to be appropriate to improve our conceptual understanding of OU4.

The selection of Low Resolution Sediment Core locations would consider sediment texture mapping from the geotechnical and geophysical survey investigations, prior transect sampling conducted by USEPA, and the investigation of tributaries to Bound Brook. It is recommended that at least two Low Resolution Sediment Cores be collected in each tributary to Bound Brook, at an adequate distance upstream of the confluence, to characterize potentially distinct contaminant 'signatures' in the sediments of each tributary. If sediment deposits appropriate for coring cannot be located in a particular tributary, sediment traps may be deployed to collect sediments from the water column over a period of 2-4 weeks to characterize sediment loads specific to the tributary. It is expected that the proposed Low Resolution Core density would be greater in data gap areas proximal to the former CDE facility and successively smaller downstream of New Market Pond. Low Resolution Cores will be advanced in the low-lying, marsh area immediately to the west of the former CDE facility and at a reduced spacing in Bound Brook between the former CDE facility and the Woodbrook Road Landfill Superfund Site.

Locations of proposed Low Resolution Sediment Core collection sites are shown on Figures 3-11a through 3-11d. Currently proposed locations of sediment coring transects include 5 transects downstream of New Market Pond, 7 transects within New Market Pond, 20 transects between New Market Pond and the former CDE facility, 5 transects adjacent to the former CDE facility, and 4 transects between the former CDE facility and the northeastern extent of OU4. It is expected that one to three sediment cores would be collected on each transect and would both confirm the utility of prior datasets and expand the dataset for COPCs other than PCBs. The sediment samples from OU4 will be analyzed for Target Compound List (TCL) VOCs, SVOCs, pesticides, herbicides, and PCB aroclors, Total Analyte List (TAL) Metals, and dioxins/furans (for selected samples).

5.4.3. Floodplain Soil Sampling

Floodplain soil sampling is proposed and may include the collection of surface and subsurface soil samples via hand auger, direct push, and hollow stem auger soil borings, as appropriate to the sample location. The soil samples collected from the floodplain will be analyzed for the same suite of chemical contaminants as the Low Resolution Sediment Core samples.

Floodplain soil borings will be located on the upland portions of the sampling transects identified in Section 5.2.2 and also on a regular grid in areas where elevated PCB concentrations were previously detected or impacts from the former CDE facility are suspected.

Currently proposed target areas for gridded floodplain soil sampling include locations proximal to the former CDE facility between the OU-2 remediation area boundary and Bound Brook and the undeveloped area on the north and south banks of Bound Brook, between Fred Allen Drive and the confluence of Bound Brook and Cedar Brook. Floodplain borings on transects will be spaced at 100-foot intervals between the water's edge and the 100-year floodplain boundary, on either side of the brook. Locations of the proposed floodplain soil sample collection sites are shown on Figures 3-11a through 3-11d. The proposed floodplain soil samples from OU4 will be analyzed for TCL/TAL parameters and dioxins/furans.

Soil borings will also be advanced in areas between Bound Brook and the former CDE facility/OU2, where buried capacitor debris has been identified, to investigate soil contaminant levels below the buried capacitor debris. If necessary, additional test pits will be conducted to supplement information currently available from USEPA regarding the location and extent of buried capacitor debris areas in OU4.

5.5. Surface Water Sample Collection

It is proposed that water column samples be collected from approximately six stations within OU4 during two storm events (type of storm event to be determined) and two routine water quality sampling events. The following representative sampling stations are proposed:

- RM6.8. Located to characterize water quality at the upstream boundary of OU4 and investigate for impacts from the Wood Brook Road Landfill Superfund Site and other potential upstream sources.
- RM6.1. Located to characterize water quality immediately downstream of the former CDE facility and the sediment areas with elevated PCB concentrations detected during the 1998 and 2007-08 USEPA sampling events.
- Cedar Brook. Located on Cedar Brook, downstream of Spring Lake but upstream of the confluence of Cedar Brook and Bound Brook, to characterize potential contaminant input from Cedar Brook.
- RM4.6. Upstream of New Market Pond but downstream of both unnamed tributaries to investigate changes in water quality following inputs from Cedar Brook and two unnamed tributaries.
- RM4.0. New Market Pond. Sample will be collected on New Market Pond upstream of the dam.
- RM0.4. Upstream of the confluence of Bound Brook and Green Brook.

The water column samples will be collected from bridges, where possible, and will use 10L Niskin bottles to obtain a representative sample. Water column samples may be collected as large volume samples and transferred to the laboratory in 20L 'pop containers' for subsequent filtering and processing at the laboratory prior to analysis. The samples will be analyzed for chemical contaminants and other parameters including total suspended solids, dissolved organic carbon, and particulate organic carbon. The collection and analysis of samples during storm events is expected to assist in the characterization of contaminated solids transport and the downstream extent of OU4.

The collection of water column samples for chemical analysis will be accompanied by the collection of hydrodynamic data and field parameters including current velocity, temperature, turbidity, pH, etc. Collection of discrete measurements is recommended at this time rather than installation of instruments for extended deployments. The chemical and hydrodynamic data, along with other datasets, will be used to understand fate and transport and to support numerical modeling of OU4, if

appropriate, which could include the use of tools such as HEC-RAS for hydraulic modeling and USEPA's WASP model for the water quality component.

Representative surface water samples from Bound Brook upstream and downstream of the former CDE Facility are also needed for the SLERA. Analysis of the surface water samples will include hardness in addition to TCL/TAL contaminants, suspended and dissolved solids, and organic carbon. Water quality parameters including temperature, pH, dissolved oxygen, conductivity, and turbidity should be collected at each sampling location. The proposed surface water sampling stations are shown on Figures 3-11a through 3-11d.

5.6. Groundwater

The Preliminary Conceptual Site Model (Tetra Tech EC, 2006) noted that characterizations of Bound Brook as a "gaining" or "losing" stream in prior RI documents were not definitive and that further investigations were required to determine the connection between contaminated groundwater in the bedrock aquifer and the brook. The work plans developed by Malcolm Pirnie for OU3 call for the installation of staff gauges in Bound Brook and the comparison of recorded surface water elevations to the potentiometric surface elevation determined from the bedrock monitoring wells. If the findings of the water level elevation comparison indicate the potential for contaminated groundwater from the former CDE facility to recharge Bound Brook, additional investigations may be required to adequately characterize the transition zone that exists between surface water in the brook and the underlying groundwater. As discussed in Evaluating Ground-Water/Surface-Water Transition Zones in Ecological Risk Assessments (USEPA, 2008), the transition zone may be an ecologically active area where a number of important ecological and physicochemical conditions and processes may occur. Adequate characterization of the migration of contaminated groundwater into the transition zone may be important for site characterization and risk assessment.

The decision to conduct additional investigation work will be dependent on the findings of initial water level comparisons to be conducted as part of the OU3 field work. If necessary, additional characterization of the transition zone may include:

- Surveys for physical features such as seeps, pools in streams, mineral precipitation, areas of sheen, etc.

- Investigations using temperature or conductivity probes, mini-piezometers with manometers or differential pressure gauges, and/or seepage meters.
- Underwater electrical resistivity surveys.
- Direct sampling of contamination in the transition zone, most likely via the insertion of passive samplers such as polyethylene sheets or specially prepared "paddles" coated with resins, or dialysis cells ("peepers") that can be deployed for a specific period and then retrieved for laboratory analysis.
- Modeling of groundwater/surface water interaction in a bedrock zone with vertical fractures.

5.7. Risk Assessment Sample Collection

This section discusses data needs specific to the development of human health and ecological risk assessments. The data needs outlined below are intended to be a subset of the data collection activities described in Sections 5.3 through 5.6 above, with the exception of toxicity testing and biota samples (such as terrestrial oligochaetes) recommended in this section.

5.7.1. Human Health Risk Assessment

The risk analysis for the HHRA requires additional data collected from the Bound Brook sediment, floodplain soil, surface water, and biota. Specific data collection requirements are detailed below.

5.7.1.1. Bound Brook Sediment

Representative brook sediment samples are recommended to evaluate current sediment quality in Reaches 5 through 9, as well as further upstream of the former CDE facility and downstream of Reach 9. The samples should be analyzed for TCL SVOCs, TCL Pesticides/PCBs, and TAL Metals. A percentage of the samples should be analyzed for PCB congeners.

Representative brook sediment samples in Reaches 1 through 4 are recommended to evaluate current sediment quality other than for PCBs. The samples should be analyzed for TCL SVOCs, TCL Pesticides/PCBs, and TAL Metals. A percentage of the samples should be analyzed for PCB congeners.

5.7.1.2. Bound Brook Bank Soil/Sediment

Representative brook bank soil/sediment samples are recommended to evaluate current brook/bank soil/sediment quality in Reaches 5 through 9, as well as further upstream of the Former CDE facility and downstream of Reach 9. The samples should be analyzed for TCL SVOCs, TCL Pesticides/PCBs, and TAL Metals. A percentage of the samples should be analyzed for PCB congeners.

Representative brook bank soil/sediment samples in Reaches 1 through 4 are recommended to evaluate current soil/sediment quality other than for PCBs. The samples should be analyzed for TCL SVOCs, TCL Pesticides/PCBs, and TAL Metals. A percentage of the samples should be analyzed for PCB congeners.

5.7.1.3. Bound Brook Surface Water

A limited number of representative surface water samples are recommended in Reaches 1 through 9, as well as further upstream of the former CDE facility and downstream of Reach 9. The samples, which should be unfiltered, should be analyzed for TCL SVOCs, TCL Pesticides/PCBs, and TAL Metals. A percentage of the samples should be analyzed for PCB congeners.

5.7.1.4. Floodplain Soil

Representative floodplain soil samples are recommended to evaluate current chemical concentrations in the floodplain along Reaches 4, 5, and 6 and perhaps Reaches 7 and 8. The samples should be analyzed for TCL SVOCs, TCL Pesticides/PCBs, and TAL Metals. A percentage of the samples should be analyzed for PCB congeners.

5.7.1.5. Biota

An informal survey of preferred fishing locations and species caught and consumed is recommended. This informal survey may be conducted by contact with local and state fish and wildlife management agencies, by direct observance during field activities, and by informal questioning of local anglers.

5.7.2. Ecological Risk Assessment

The risk analysis for the ERA requires additional data collection from Bound Brook sediment, floodplain soil, surface water, and biota. Specific data collection requirements are detailed below.

5.7.2.1. Sediment Data

Some level of confirmatory sediment sampling is recommended given the age of the sediment data (2000 or older) and the hydrology of the brook, in which some storm events can 'flush out' the system, potentially scouring accumulated sediments from the stream bed. Additional sediment sampling is also recommended mid-lake in New Market Pond, as previous sampling was concentrated in the eastern and western ends of the pond.

Analysis of confirmatory sediment samples is recommended for TCL SVOCs, TCL Pesticides/PCBs, PCB congeners, TAL Metals, TOC, acid volatile sulfides and simultaneously extracted metals, oxidation/reduction potential, and grain size.

Evaluation of a future scenario accounting for the potential of scour and other environmental processes exposing deeper sediments may also be considered in the ERA.

5.7.2.2. Surface Water

Representative surface water samples in Reaches 1 through 9 and upstream of the former CDE facility and downstream of the Wood Brook Road Landfill Superfund Site are also recommended for the ERA. Analysis should include TCL SVOCs, TCL Pesticides/PCBs, TAL Metals, and hardness. Water quality parameters including temperature, pH, dissolved oxygen, conductivity, and turbidity should be collected at each sampling location. Water quality sampling stations should include Spring Lake, Cedar Brook, and the area between New Market Pond and the Raritan River.

5.7.2.3. Measurement Endpoint-Specific Data Needs

To assist in evaluating assessment endpoint #1, suitable reference data from published scientific literature will be identified. In additional, reference areas with similar stream morphology and surrounding land cover and land use as Bound Brook, but without the presence of chemical stressors, will be located and sampled. Limited

sediment and floodplain soil sampling for TCL SVOCs, TCL Pesticides/PCBs, PCB congeners, TAL Metals, TOC, acid volatile sulfides and simultaneously extracted metals, oxidation/reduction potential, and grain size should be conducted.

In Phase II of the 1997/1998 investigation, sediment toxicity tests were conducted with the amphipod *Hyalella azteca* using six sediment samples collected from Bound Brook (from the former CDE facility to New Market Pond) plus a sample collected at an upstream reference area. Short-term and long-term laboratory-based sediment toxicity testing using multiple standard test organisms should be conducted to determine whether chemical stressors in Bound Brook are impacting benthic invertebrate populations. Sediment from the reference area(s) should be included in the recommended sediment toxicity testing.

The Ecological Evaluation (USEPA, 1999) references the following USEPA documents:

- USEPA, 1992. *Stream Assessment, Green Brook Drainage, New Jersey.* USEPA Region II Ambient Monitoring Section. Environmental Services Division.
- USEPA, 1993. *Stream Assessment, Bound Brook, New Jersey – [Fish].* USEPA Region II Ambient Monitoring Section. Environmental Services Division.
- USEPA, 1993. *Stream Assessment, Bound Brook, New Jersey – [Macroinvertebrates].* USEPA Region II Ambient Monitoring Section. Environmental Services Division.

These documents are very briefly summarized in the Ecological Evaluation (USEPA, 1999); however, each will be obtained and reviewed to determine the availability and extent of benthic macroinvertebrate and community data within Bound Brook. No further evaluation of macroinvertebrate communities within Bound Brook is proposed at this time.

Aquatic oligochaete bioaccumulation testing is recommended to supplement existing macroinvertebrate data. Sediment samples will be collected from select locations and used in a laboratory bioaccumulation test for an infaunal oligochaete species (*e.g.*, *Lumbriculus variegates*). The whole body tissue residue from such testing

will be used in food chain accumulation modeling in the ERA. Aquatic oligochaete tissue should be analyzed for TCL SVOCs, TCL Pesticides/PCBs, PCB congeners, TAL Metals, and percent lipids.

To assist in evaluating assessment endpoint #4, additional floodplain soil characterization should be conducted specifically in the riparian areas and forested wetlands between the historic 1997 Phase II sampling locations T1 and T2, upstream of the former CDE facility and downstream of the Wood Brook Road Landfill Superfund Site, and downstream of New Market Pond. Analysis of floodplain soils should include TCL SVOCs, TCL Pesticides/PCBs, TAL Metals, and total organic carbon.

In Phase II of the Ecological Evaluation (USEPA, 1999), white-footed mice were collected from three locations adjacent to and downstream of the former CDE facility and in one reference area between the confluence of Cedar Brook with Bound Brook and Spring Lake. Additional white-footed mouse whole body residue samples are not recommended for the RI floodplain soil characterization. Rather, collection of terrestrial oligochaetes for whole body tissue residue analysis is recommended for use in food chain accumulation modeling in the ERA. These samples should be co-located with floodplain soil samples. In the event sufficient biomass cannot be collected, laboratory bioaccumulation testing will be conducted using collected floodplain soil. Terrestrial oligochaete tissue should be analyzed for TCL SVOCs, TCL Pesticides/PCBs, PCB congeners, TAL Metals, and percent lipids.

5.8. Cultural Resources Data Collection

OU-4 consists of an extensive stretch of the Bound Brook channel, its floodplain, and adjoining locations. Contaminated soils and sediments within as-yet-unidentified portions of OU-4 may be disturbed during future remedial construction activities. Any archaeological or architectural resources that are located within the areas of remediation may be destroyed or disturbed by remedial activities. The National Historic Preservation Act requires federal agencies to conduct appropriate activities to identify, evaluate, and protect significant historic and prehistoric properties that their actions potentially affect. To carry out these requirements within OU-4, a Phase IA cultural resources investigation will be performed to determine whether potentially significant properties, possibly eligible for listing on the New Jersey State and National Registers of Historic Places,

might be located within or adjacent to the contaminated portions of the Bound Brook channel, its floodplain, and adjoining locations.

The spatial extent of the locations to be investigated by the Phase IA study will be determined based on the characterization of the extent of contamination via the RI field investigations. For the purposes of the archaeological investigation, and in keeping with the terminology currently employed by the New Jersey State Historic Preservation Office (NJSHPO), the locations requiring remediation will be referred to as the project's Area of Potential Effect (APE). The APE consists of all areas within OU-4 that will be directly or indirectly impacted by proposed remedial activities.

The Archaeological Work Plan (AWP) that will be developed for the Phase IA investigation will outline the technical efforts necessary to determine the sensitivity of the still-to-be-identified areas of soil contamination (the APE) within OU-4 for the presence of possibly significant archaeological and architectural resources. The work for the Phase IA report will consist of three Tasks. The Tasks are necessary to provide the USACE-KCD, USEPA, and the NJSHPO sufficient information to evaluate those locations and, if necessary, to develop plans to mitigate the impacts to them that will result from remediation activities. All work will be conducted in accordance with the requirements of Sections 106 and 110 of the National Historic Preservation Act of 1966 and its implementing regulations [*i.e.*, 36 Code of Federal Regulations (CFR) Part 800], Executive Order 11593 and the guidelines and standards currently adopted by the NJSHPO.

5.8.1. Documentary Research

This task will consist of documentary research and a pedestrian reconnaissance of the APE. At a minimum, research for the work will be conducted at the NJSHPO, New Jersey State Museum, New York City Public Library, local historical societies, and other appropriate local repositories. Experts and other knowledgeable people also will be interviewed. Based on that work, the archaeological sensitivity of the APE will be assessed. Assessment of Native American period sensitivity will be based on the locations of known archaeological sites reported in the literature, as well as a consideration of the current and former topographic and physiographic characteristics of the APE. For investigated areas within the Bound Brook floodplain, particular attention

will be paid to the potential for the presence of Native American archaeological sites deeply buried within the alluvium. To aid in the evaluation, appropriate, previously conducted geotechnical borings will be reviewed.

Research on the developmental history and assessment of the Historic period sensitivity of the property will be based on analyses of eighteenth through twentieth century maps as well as a review of other primary and secondary sources. As part of the task, determinations will be made of the extent to which past construction activities and other events would have affected the preservation of any archaeological resources potentially present within the APE.

5.8.2. Preliminary Architectural Survey

This task will consist of a preliminary architectural survey of existing structures within or adjacent to the APE. All structures listed on the New Jersey State and National Registers of Historic Places in proximity to the APE will be identified. Other structures will be evaluated in terms of their architectural styles and engineering, and their roles in potentially significant events. At a minimum, research for the work will be conducted at the NJSHPO, New Jersey State Museum, New York City Public Library, local Historical Societies, and other appropriate local repositories. Experts and other knowledgeable people also will be interviewed.

5.8.3. Draft Phase IA Cultural Resources Report

Copies of the draft Phase IA cultural resources investigation report will be submitted to the USACE-KCD, USEPA, and NJSHPO for review and comment. The report will detail the methodology employed to conduct the Phase IA study, presenting the results of the work, providing conclusions on the presence or absence of possibly significant archaeological and architectural resources, and presenting recommendations for any warranted additional investigations. If no additional investigations of all or portions of the APE are warranted, such conclusion will be clearly stated in the report.

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7. GLOSSARY OF ABBREVIATIONS

AOC	Administrative Order on Consent
APE	Area of Potential Effect
ARARs	Applicable or Relevant and Appropriate Requirements
AWP	Archaeological Work Plan
^{7}Be	Beryllium – 7
BGS	Below Ground Surface
CDA	Capacitor Disposal Area
CDE	Cornell-Dubilier Electronics
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulation
COPC	Contaminant of Potential Concern
COPEC	Contaminant of Potential Ecological Concern
CSEM	Conceptual Site Exposure Model
CSM	Conceptual Site Model
^{137}Cs	Cesium – 137
DQO	Data Quality Objectives
DSC	D.S.C. of Newark Enterprises, Inc.
ERA	Ecological Risk Assessment
ESL	Ecological Screening Levels

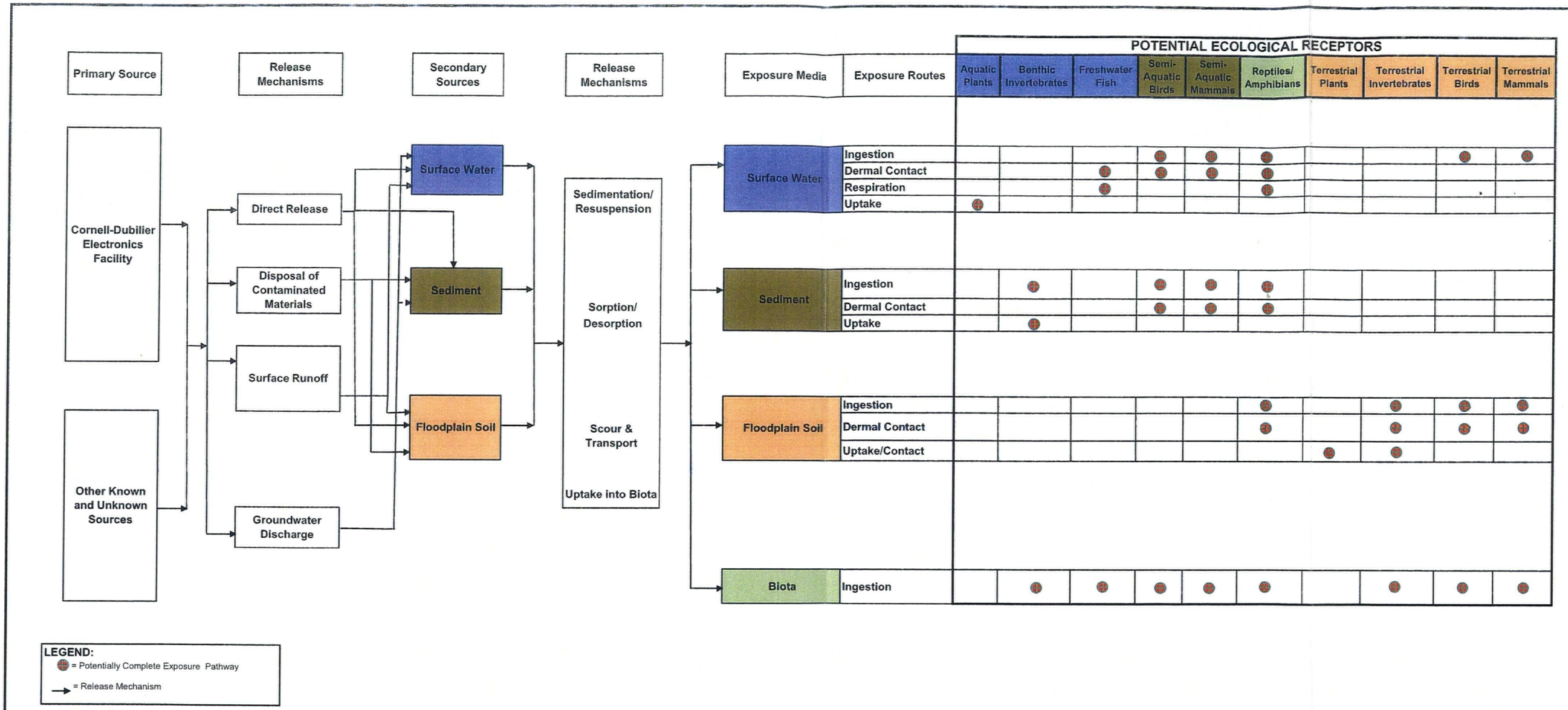
FEMA	Federal Emergency Management Agency
FS	Feasibility Study
FSP	Field Sampling Plan
HHRA	Human Health Risk Assessment
IGWSCC	Impact to Groundwater Soil Cleanup Criteria
LEL	Lowest Effects Level
LTTD	Low Temperature Thermal Desorption
mg/kg	milligrams per kilogram
NCP	National Contingency Plan
NJDEP	New Jersey Department of Environmental Protection
NJSHPO	New Jersey State Historical Preservation Office
NPL	National Priorities List
OU	Operable Unit
OU1	Operable Unit 1
OU2	Operable Unit 2
OU3	Operable Unit 3
OU4	Operable Unit 4
^{210}Pb	Lead – 210
PCB	Polychlorinated Biphenyls
ppm	parts per million
PQO	Project Quality Objectives
RI	Remedial Investigation

RI/FS	Remedial Investigation / Feasibility Study
RM	River Mile
RPM	Remedial Project Manager
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SEL	Severe Effects Level
SLERA	Screening Level Ecological Risk Assessment
SSS	Side Scan Sonar
SVOC	Semi Volatile Organic Chemical
TAL	Target Analyte List
TCL	Target Compound List
Tech Memo	Technical Memorandum
TOC	Total Organic Carbon
TRVs	Toxicity Reference Values
µg/Kg	Microgram / Kilogram
USACE-KCD	U.S. Army Corps of Engineers – Kansas City District
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound

TABLES

TABLE 4-1
HUMAN HEALTH CONCEPTUAL SITE MODEL FOR OU4
CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Currrent/Future	Surface Water	Surface Water	Bound Brook	Recreationist	Adult	Indicental Ingestion	Qual	Surface water could be contacted while wading or otherwise recreating in and along Bound Brook.
						Dermal Contact	Quant	
						Inhalation	Qual	
					Adolescent	Indicental Ingestion	Qual	
						Dermal Contact	Quant	
						Inhalation	Qual	
				Culvert/Spillway Worker	Audlt	Incidental Ingestion	Qual	Surface water could be contacted while maintaing and/or cleaning culverts, spillways, and other structures in and along Bound Brook.
						Dermal Contact	Quant	
						Inhalation	Qual	
				Angler	Adult	Incidental Ingestion	Qual	Surface water could be contacted while fishing in or along Bound Brook.
						Dermal Contact	Quant	
						Inhalation	Qual	
	Sediment	Sediment	Bound Brook	Recreationist	Adult	Incidental Ingestion	Quant	Sediment could be contacted while wading or otherwise recreating in and along Bound Brook.
						Dermal Contact	Quant	
						Inhalation	Qual	
					Adolescent	Incidental Ingestion	Quant	
						Dermal Contact	Quant	
						Inhalation	Qual	
				Culvert/Spillway Worker	Audlt	Incidental Ingestion	Quant	Sediment could be contacted while maintaing and/or cleaning culverts, spillways, and other structures in and along Bound Brook.
						Dermal Contact	Quant	
						Inhalation	Qual	
				Angler	Adult	Incidental Ingestion	Quant	Sediment could be contacted while fishing in or along Bound Brook.
						Dermal Contact	Quant	
						Inhalation	Qual	
	Bank Soil/Sediment	Bank Soil/Sediment	Bound Brook	Recreationist	Adult	Incidental Ingestion	Quant	Bank soil/sediment could be contacted while wading or otherwise recreating in and along Bound Brook.
						Dermal Contact	Quant	
						Inhalation	Qual	
					Adolescent	Incidental Ingestion	Quant	
						Dermal Contact	Quant	
						Inhalation	Qual	
				Angler	Adult	Incidental Ingestion	Quant	Bank soil/sediment could be contacted while fishing in or along Bound Brook.
						Inhalation	Qual	
				Culvert/Spillway Worker	Audlt	Incidental Ingestion	Quant	Bank soil/sediment could be contacted while maintaing and/or cleaning culverts, spillways, and other structures in and along Bound Brook.
						Dermal Contact	Quant	
						Inhalation	Qual	
	Floodplain Soil	Floodplain Soil	Adjacent to Bound Brook	Resident	Adult	Incidental Ingestion	Quant	Floodplain soil could be contacted while recreating in floodplain areas adjacent to Bound Brook
						Dermal Contact	Quant	
						Inhalation	Quant	
					Child	Incidental Ingestion	Quant	
						Dermal Contact	Quant	
						Inhalation	Quant	
				Commercial/Industrial Worker	Adult	Incidental Ingestion	Quant	Floodplain soil could be contacted while working in floodplain areas adjacent to Bound Brook
						Dermal Contact	Quant	
						Inhalation	Quant	
				Construction/Utility Worker	Adult	Incidental Ingestion	Quant	Floodplain soil could be contacted while working in floodplain areas adjacent to Bound Brook
						Dermal Contact	Quant	
						Inhalation	Quant	
	Biota	Fish	Bound Brook and Tributaries	Angler/Sportsman	Adult	Ingestion	Quant	Locally-caught fish could be consumed.
					Child	Ingestion	Quant	
		Other Biota	Bound Brook and Tributaries	Angler/Sportsman	Adult	Ingestion	Qual/Quant	The possibility that other biota (i.e., crayfish, frogs, turtles) are caught locally and consumed will be investigated.
					Child	Ingestion	Qual/Quant	



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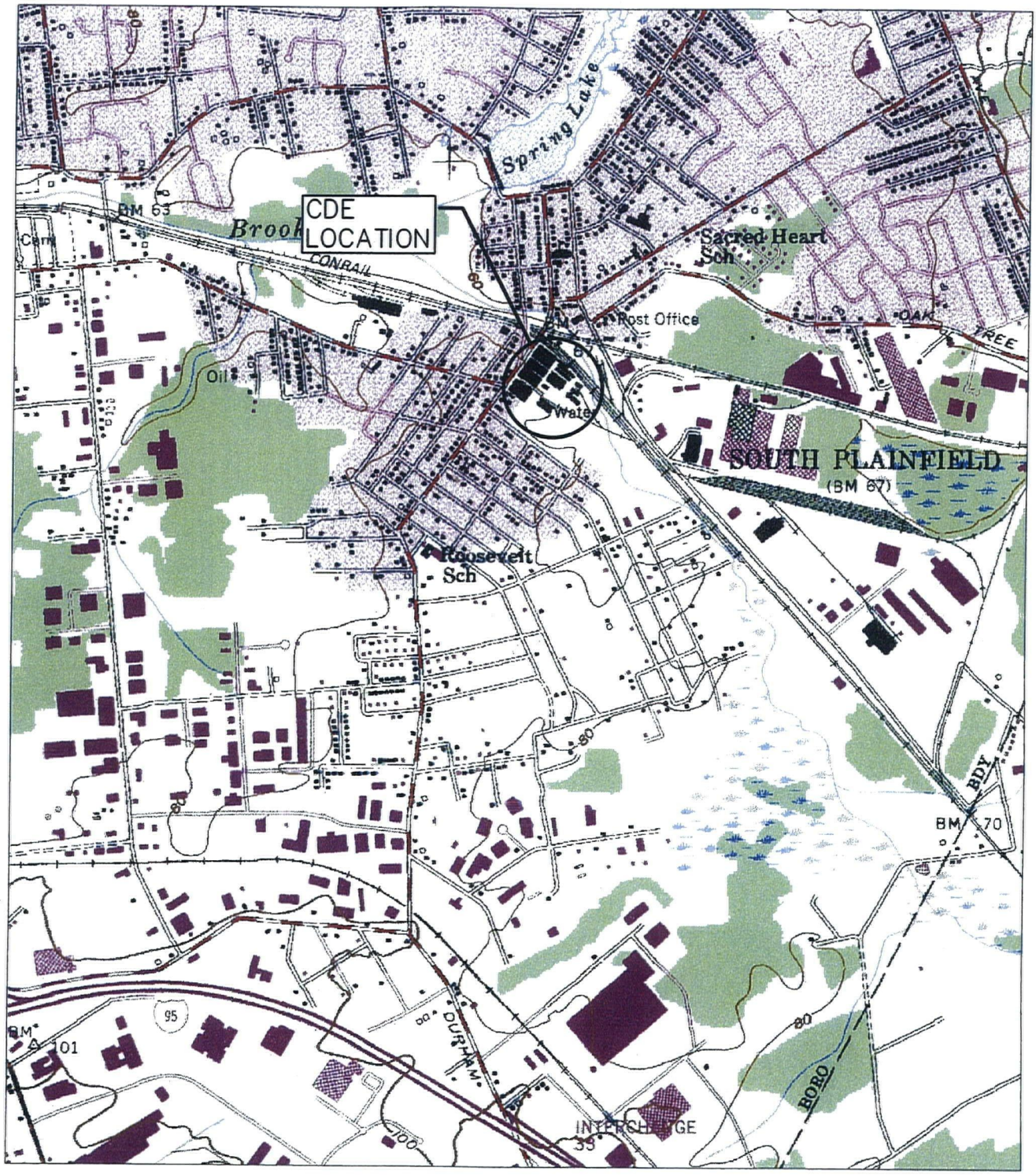
PRELIMINARY ECOLOGICAL CONCEPTUAL SITE EXPOSURE MODEL FOR OU4
Cornell-Dubilier Electronics Superfund Site OU4
South Plainfield, New Jersey

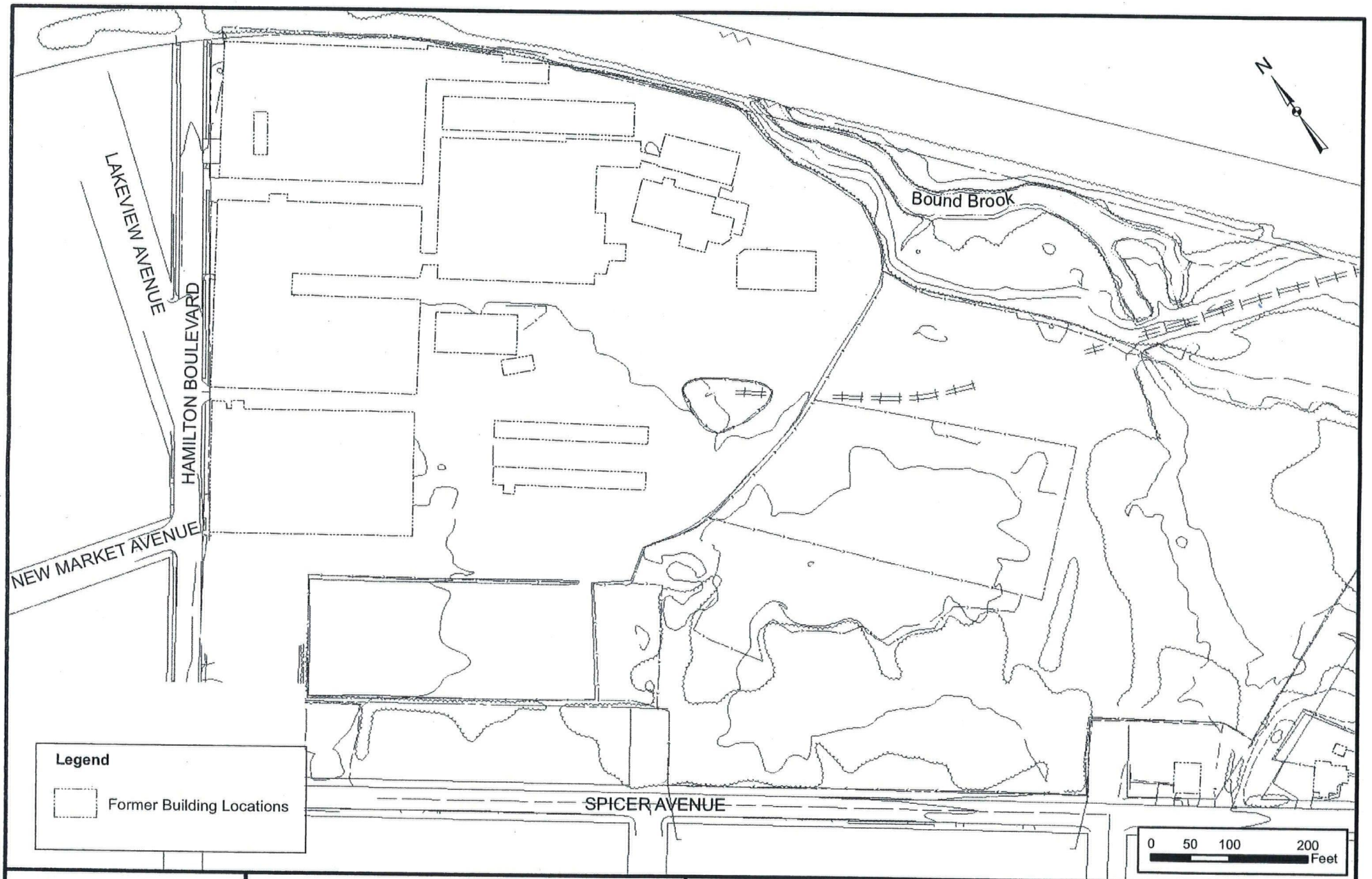
Table 4-2

FIGURES



SOURCE: U.S.G.S. TOPOGRAPHIC MAP,
7.5 MINUTE SERIES, PLAINFIELD, NEW JERSEY
QUADRANGLE, 1955, PHOTOREVISED 1981

MALCOLM PIRNIE	U.S. ARMY CORPS OF ENGINEERS CORNELL–DUBILIER SUPERFUND SITE SOUTH PLAINFIELD, NEW JERSEY CONTRACT NO. W912DQ–08–D–0017	FORMER CDE FACILITY LOCATION MAP SCALE AS NOTED	MALCOLM PIRNIE, INC. MARCH 2009 FIGURE 2–1



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CORNELL-DUBILIER ELECTRONICS
SUPERFUND SITE
SOUTH PLAINFIELD, NEW JERSEY

FORMER CDE FACILITY PLAN

MALCOLM PIRNIE, INC.

MARCH 2009

FIGURE 2-2

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N

Note: Sampling Locations are provided by Tetra Tech Inc. (2006)

Legend

- Sediment Samples
- Soil Samples
- Dam Locations
- Culvert
- Historical Outfall Locations
- Bound Brook Centerline
- Former CDE Facility
- Areas
- Reaches
- Waterbody
- Bridges

GREEN BROOK

AMBROSE BROOK

Lake Creighton

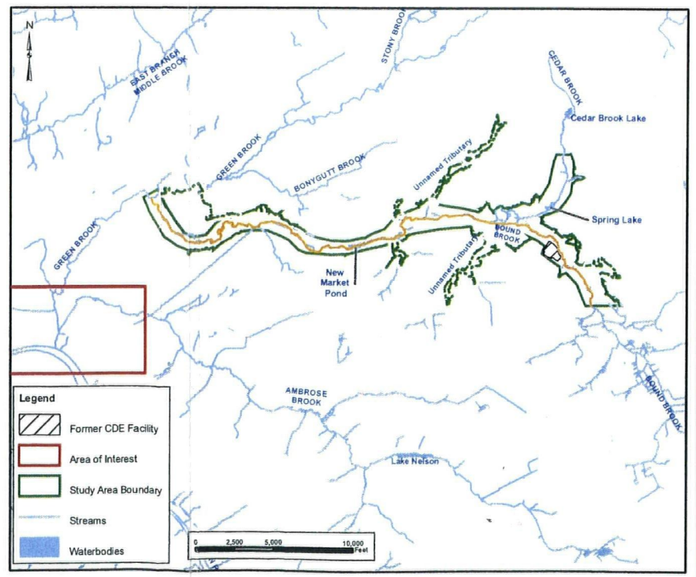
AQ14-2

AQ14

AQ14-1

DELAWARE AND RARITAN CANAL

0 125 250 500 Feet



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Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

Historical Sampling Locations for the Ecological Risk Assessment

OU4 Remedial Investigation/Feasibility Study

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MARCH 2009

Figure 2-2 a

N

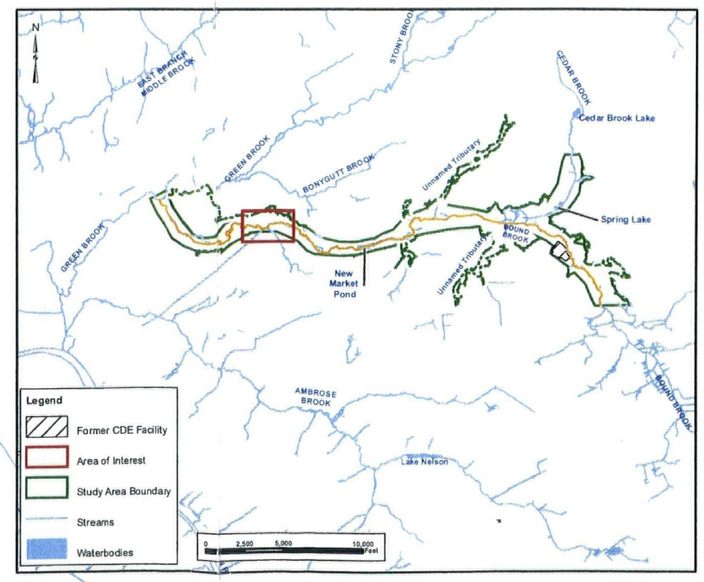
1.8
1.9
2
2.1
2.2
2.3
2.4
AQ13-2
AQ13-1
AQ13

Note: Sampling Locations are provided by Tetra Tech Inc. (2006)

Legend

- Sediment Samples
- Soil Samples
- Dam Locations
- Culvert
- Historical Outfall Locations
- Bound Brook Centerline
- Former CDE Facility
- Areas
- Reaches
- Waterbody
- Bridges

0 125 250 500 Feet



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Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

Historical Sampling Locations for the Ecological Risk Assessment

OU4 Remedial Investigation/Feasibility Study

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Figure 2-2 b

N

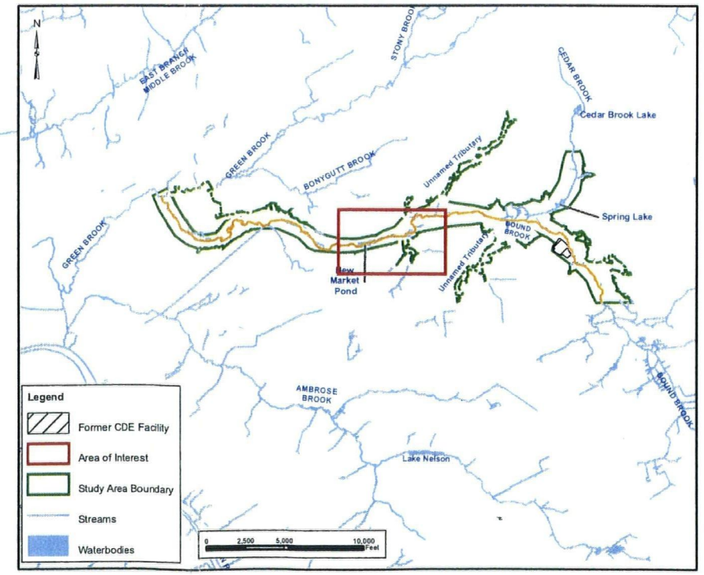
T3-3-10
T3-2-11
T3-1-7
T3-3-16
T3-4-6
T3-1-13
AQ4-1
AQ4
AQ4-2
4.4
4.5
4.7
4.3
4.2
AQ5-2
AQ5
AQ5-1
4.1
Reach 8
3.8
3.9
New Market Pond
Reach 9
3.2
3.3
AQ11-1
AQ7
3.4
AQ7-1
AQ11
AQ11-2
3.5
3.6
AQ6-1
AQ6
AQ6-2
AQ12-1
AQ12
AQ12-2

Note: Sampling Locations are provided by Tetra Tech Inc. (2006)

Legend

- Sediment Samples
- Soil Samples
- Dam Locations
- Culvert
- Historical Outfall Locations
- Bound Brook Centerline
- Former CDE Facility
- Areas
- Reaches
- Waterbody
- Bridges

0 125 250 500 Feet



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Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

Historical Sampling Locations for the Ecological Risk Assessment

OU4 Remedial Investigation/Feasibility Study

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Figure 2-2 c

N

Reach 6

AQ3-1 AQ3

AQ3-2

5.3

Reach 7

5.4

Area 3

5.5

Unnamed Tributary

AQ2-1 AQ2 AQ2-2

T2-5-6

T2-6-7

T2-12-5

T2-7-1

T2-2-1

T2-1-3

Area 4

Unnamed Tributary

T4-2-19

Area 2

CEDAR BROOK

T4-1-10

T4-5-6

T4-1-4

T4-4-1

T4-3-3

5.8

5.9

BOUND BROOK

Area 1

Reach 5

6.1

AQ10-2

AQ10

Spring Lake

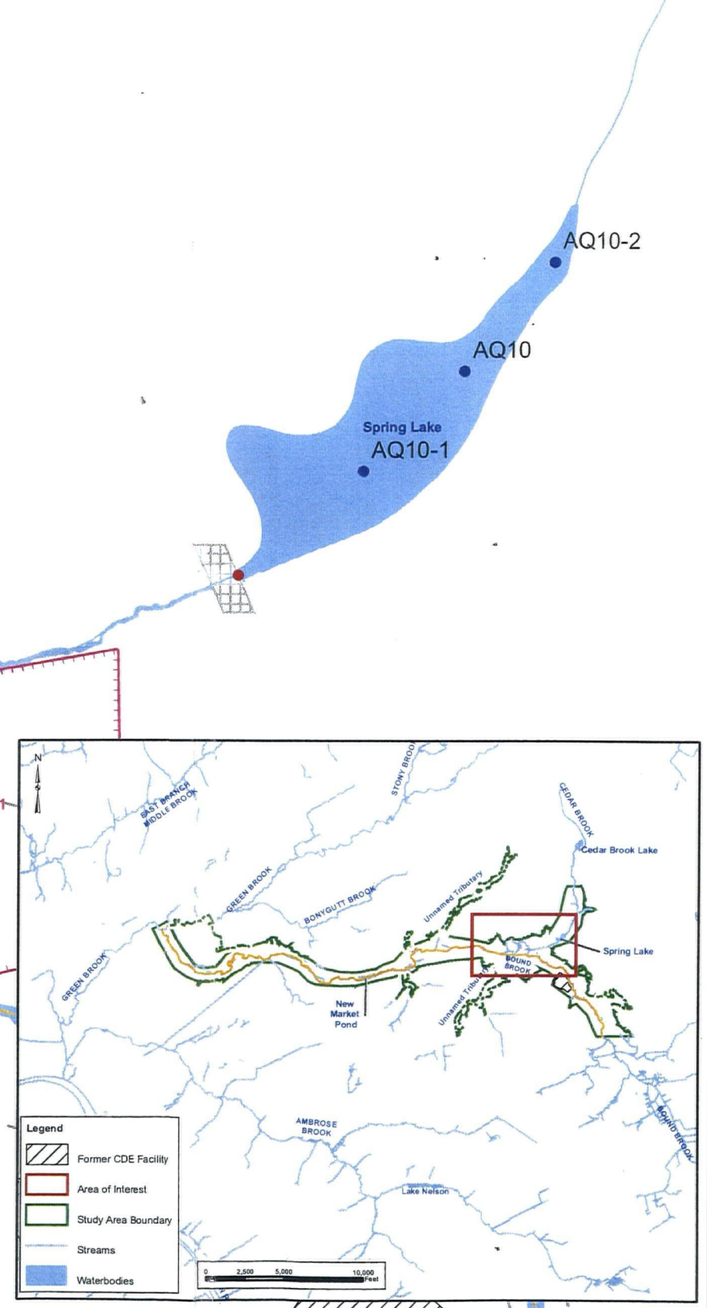
AQ10-1

Note: Sampling Locations are provided by Tetra Tech Inc. (2006)

Legend

- Sediment Samples
- Soil Samples
- Dam Locations
- Culvert
- Historical Outfall Locations
- Bound Brook Centerline
- Former CDE Facility
- Areas
- Reaches
- Waterbody
- Bridges

0 125 250 500 Feet



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Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

Historical Sampling Locations for the Ecological Risk Assessment

OU4 Remedial Investigation/Feasibility Study

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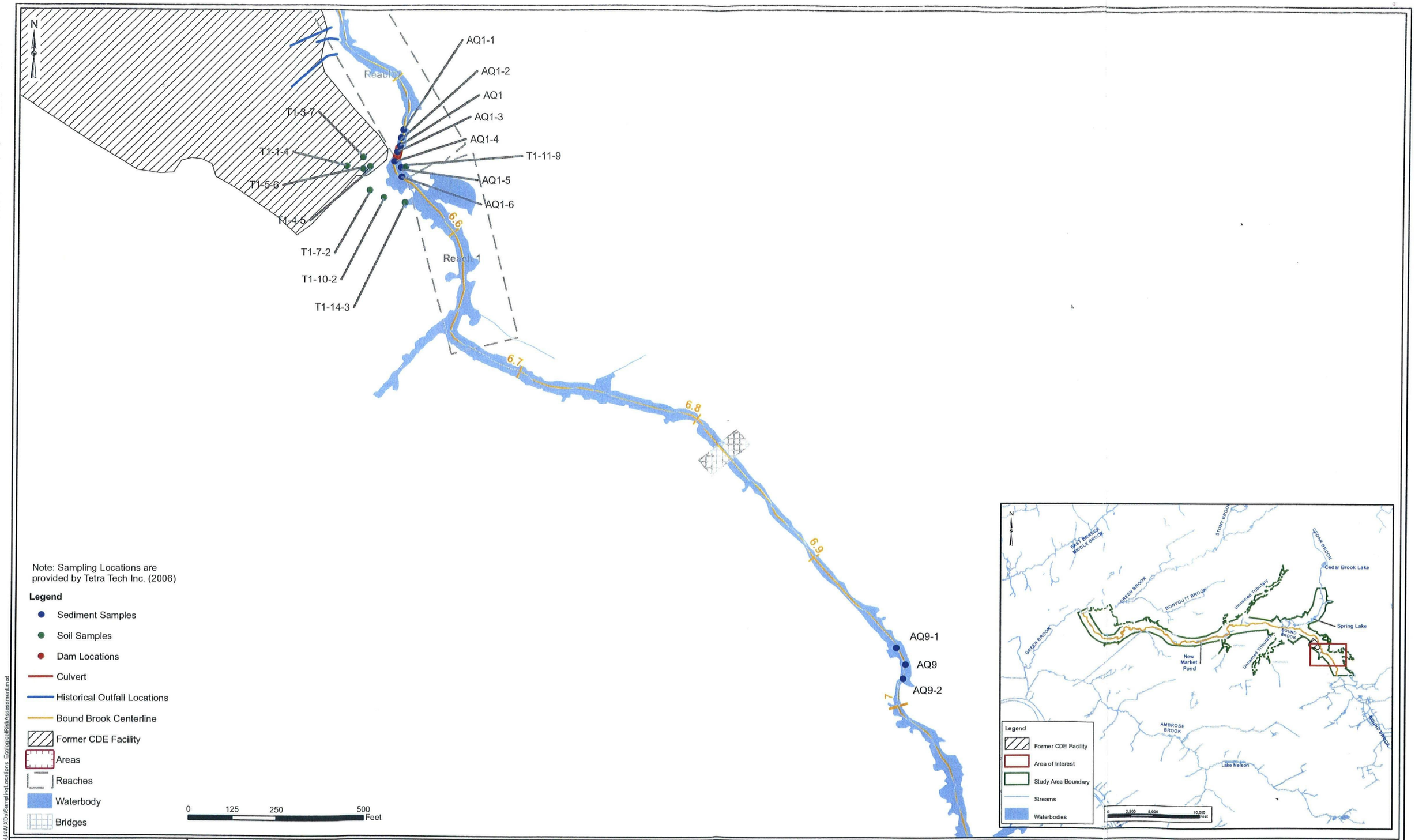
Figure 2-2 d



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Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

Historical Sampling Locations for the Ecological Risk Assessment

OU4 Remedial Investigation/Feasibility Study

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Figure 2-2 e

N

Reach 8

Reach 7

Transect RRRR

Transect QQQQ

Transect PPPP

Transect OOOO

Transect NNNN

Transect MMMM

Transect LLLL

Transect KKKK

New Brunswick Avenue

Transect JJJJ

Transect IIII

Transect HHHH

Transect GGGG

Transect FFFF

Transect EEEE

Transect DDDD

Transect CCCC

Transect BBBB

Transect AAAA

Transect SSSS

Transect TTTT

Transect UUUU

Railroad Crossing

Transect VVVV

New Market Pond

4:1

4:2

4:3

4:4

4:5

4:6

4:7

4:8

4:9

5

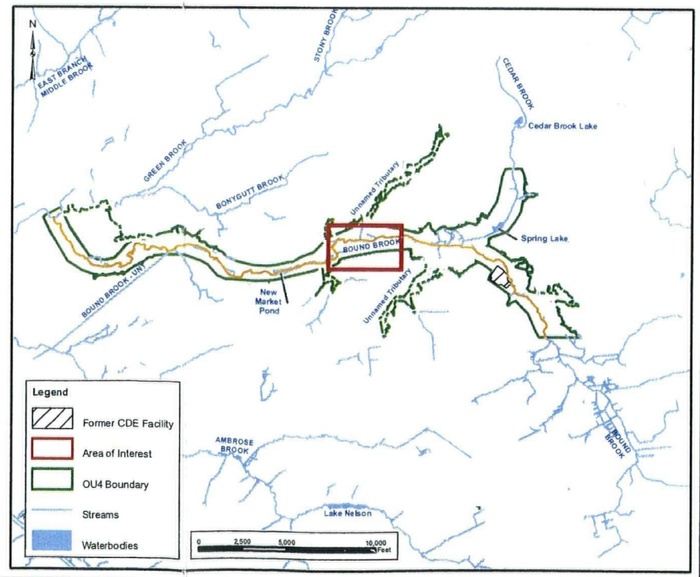
5:1

0 62.5 125 250 Feet

Legend

- Sediment Samples
- Soil Samples
- Culvert
- Historical Outfall Location
- Bound Brook Centerline
- Former CDE Facility
- Areas
- Reaches
- Waterbody
- Bridges

Note: Sampling Locations are provided by Tetra Tech Inc. (2006)



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Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

Historical Sampling Locations for the 1997 Soil and Sediment Sampling Program

OU4 Remedial Investigation/Feasibility Study

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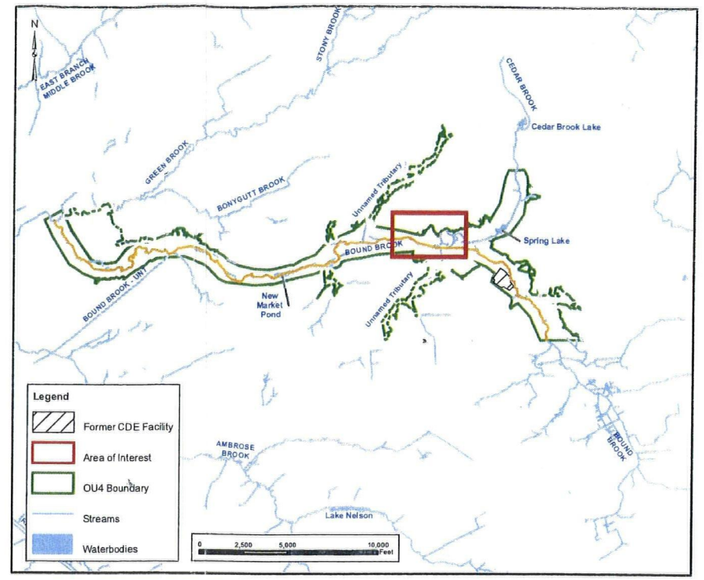
Figure 2-3 a



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Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

Historical Sampling Locations for the 1997 Soil and Sediment Sampling Program

OU4 Remedial Investigation/Feasibility Study

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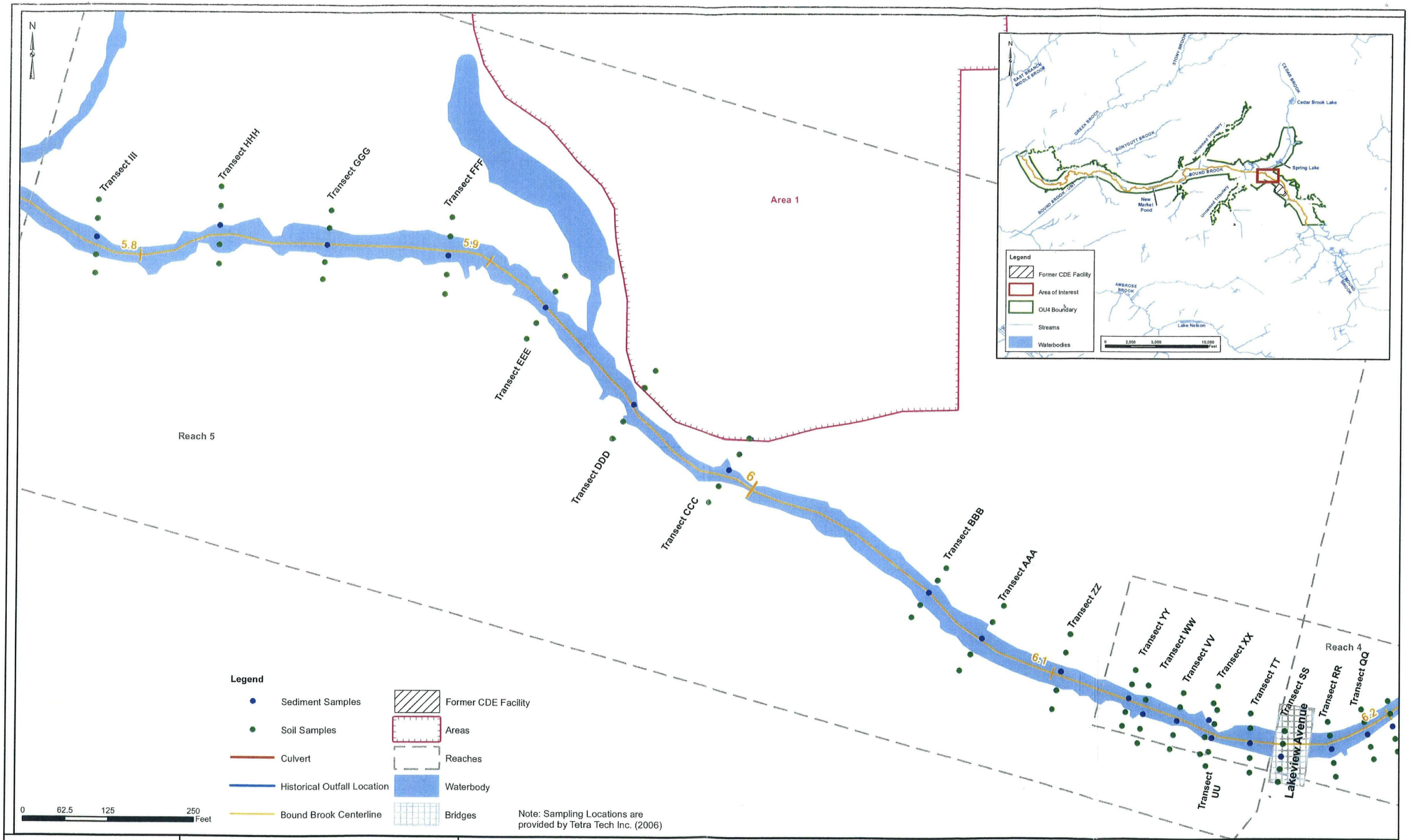
Figure 2-3 b



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Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

Historical Sampling Locations for the 1997 Soil and Sediment Sampling Program

OU4 Remedial Investigation/Feasibility Study

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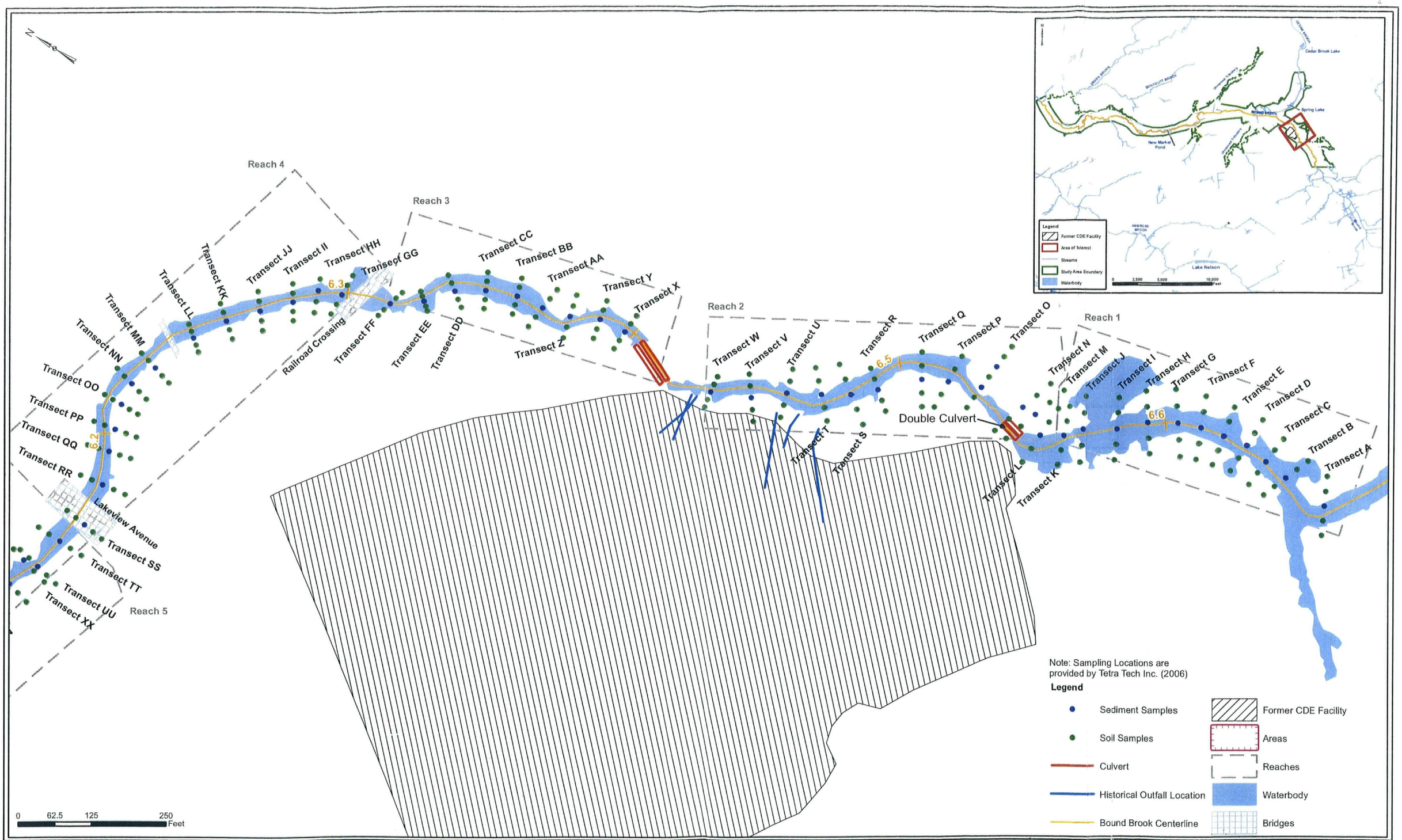
Figure 2-3 c



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Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

Historical Sampling Locations for the 1997 Soil and Sediment Sampling Program

OU4 Remedial Investigation/Feasibility Study

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Figure 2-3 d

N

Reach 6

Reach 5

Spring Lake

CEDAR BROOK - UNT

BOUND BROOK - UNT

CEDAR BROOK

BOUND BROOK - UNT

Area 1

Area 2

Area 3

Area 4

5.3

5.6

5.7

5.8

5.9

6

Note: Sampling Locations are provided by Tetra Tech Inc. (2006)

Legend

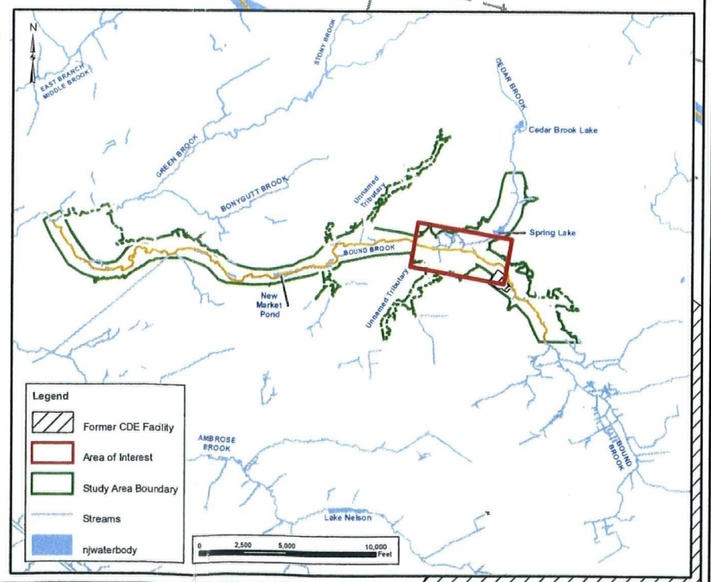
Area

- Area 1
- Area 2
- Area 3
- Area 4

Sample Type

- Sediment
- Soil
- Dam Locations
- Bound Brook Centerline
- Waterbody
- Reaches
- Areas
- Bridges

0 125 250 500 Feet



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Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

Historical Sampling Locations for the 1999 Soil and Sediment Sampling Program

OU4 Remedial Investigation/Feasibility Study

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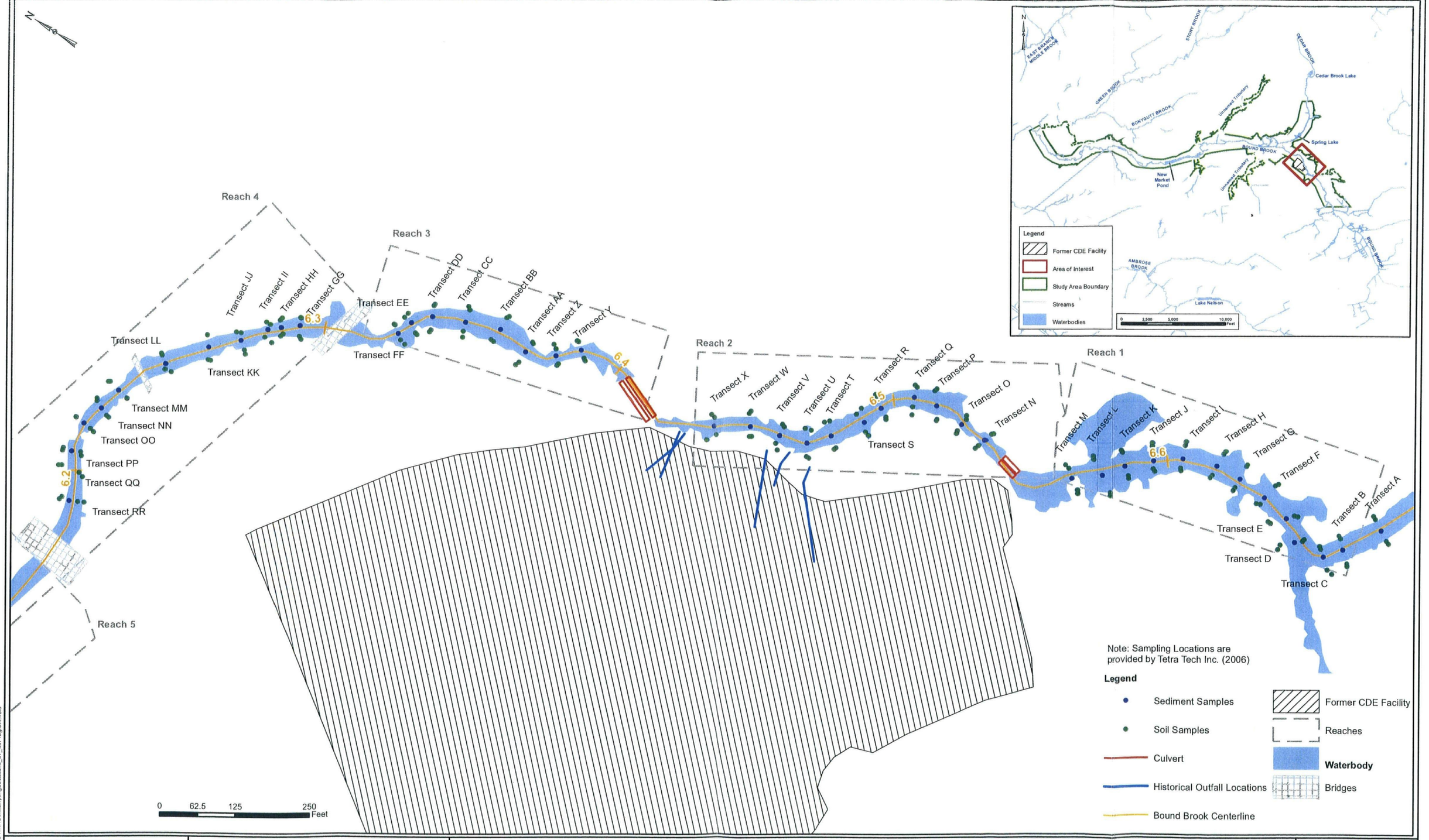
Figure 2-4



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Cornell-Dubilier Electronics Superfund Site

South Plainfield, New Jersey

Historical Sampling Locations for the 2007-2008 Soil and Sediment Sampling Program

OU4 Remedial Investigation/Feasibility Study

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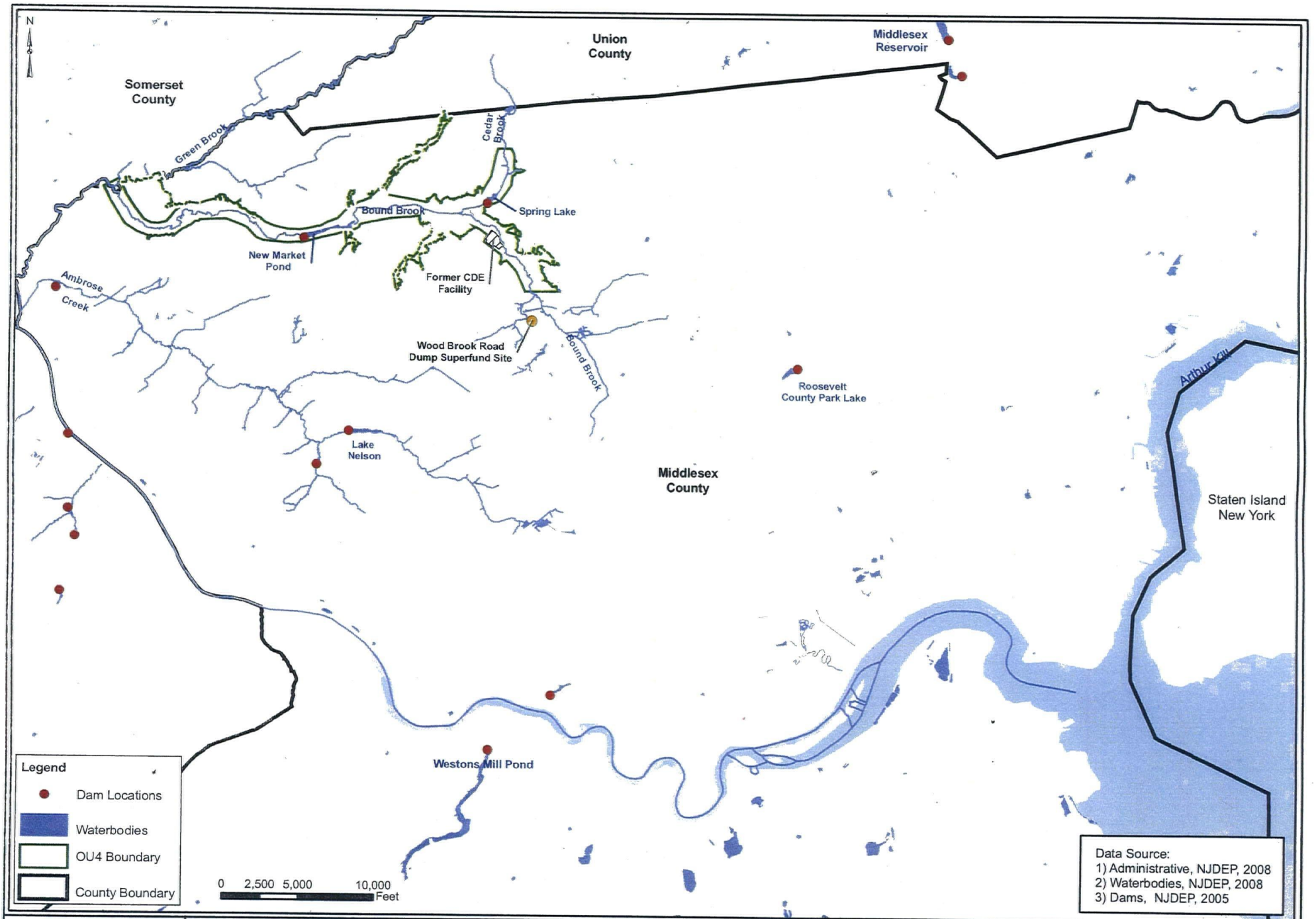
Figure 2-5



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Cornell-Dubilier Electronics
Superfund Site
South Plainfield, New Jersey

OU4 Location Map

OU4 Remedial Investigation/Feasibility Study

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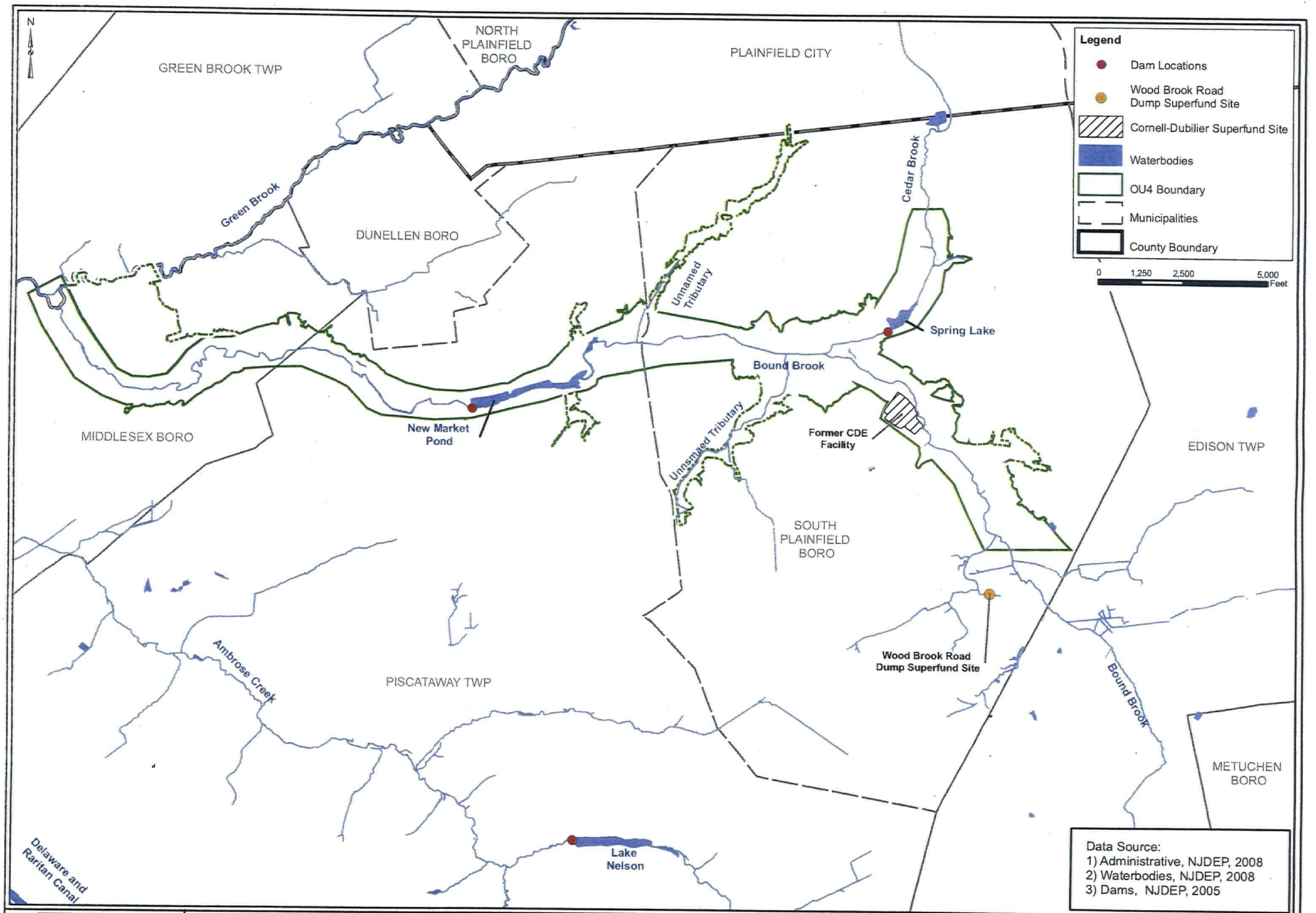
FIGURE 3-1 a



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Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

OU4 Location Map
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
MARCH 2009
FIGURE 3-1 b

Note:
1) Sampling Locations are provided by Tetra Tech Inc. (2006)
2) All the Sample Locations for the residential areas start with RS3X-XX

Legend

- Residential Area 31
- Residential Area 32
- Residential Area 33
- Surface Soil
- Bound Brook Centerline
- Former CDE Facility
- Waterbody
- Culvert
- Historical Outfall Locations
- Dam Locations
- Bridges

0 125 250 500 Feet

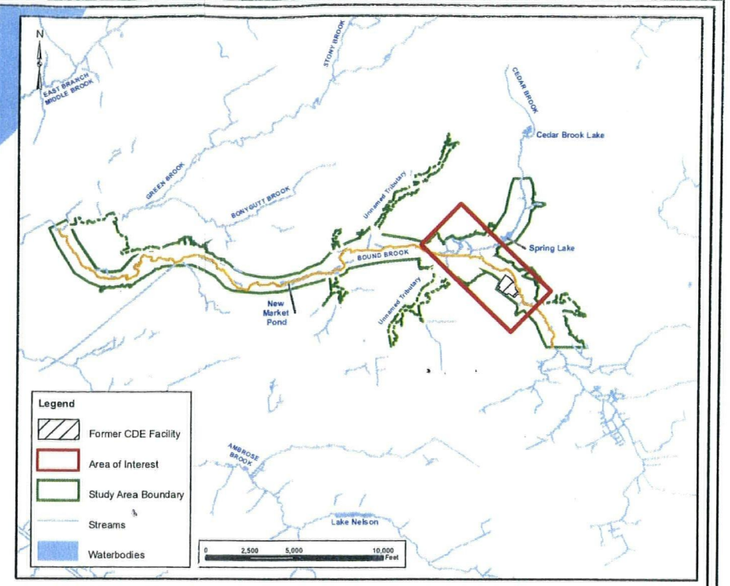
Reach 6
Reach 5
Reach 4
Reach 3
Reach 2
Reach 1

Area 1
Area 2
Area 3
Area 4

5.5 5.6 5.7 5.8 5.9 6 6.1 6.2 6.3 6.4 6.5 6.6

SS01 SS02 SS03 SS04 SS05 SS06

Spring Lake



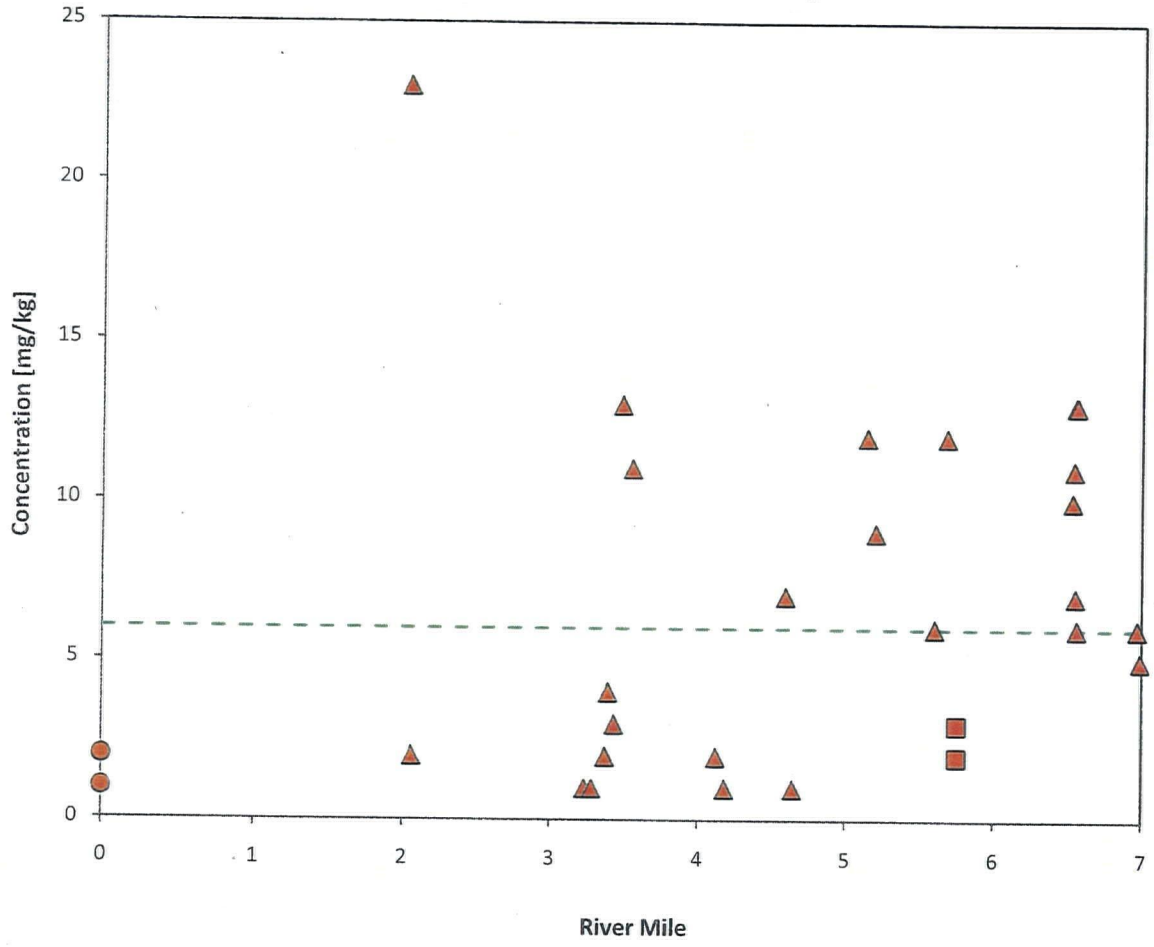
MALCOLM PIRNIE

Cornell-Dubilier Electronics
Superfund Site
South Plainfield, New Jersey

Historical Sampling Locations for Miscellaneous 2000 Residential and Surface Soil Samples
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
MARCH 2009
FIGURE 3-3

S:\Projects\4153b...\OU4\MXD\...\SamplingLocations_Misc2000Program.mxd



Colors Legend

- 1997- Bound Brook
- 1997- Green Brook
- 1997- Cedar Brook
- Lowest Effects Level

Symbols Legend

- Bound Brook
- Green Brook
- Cedar brook

Notes:

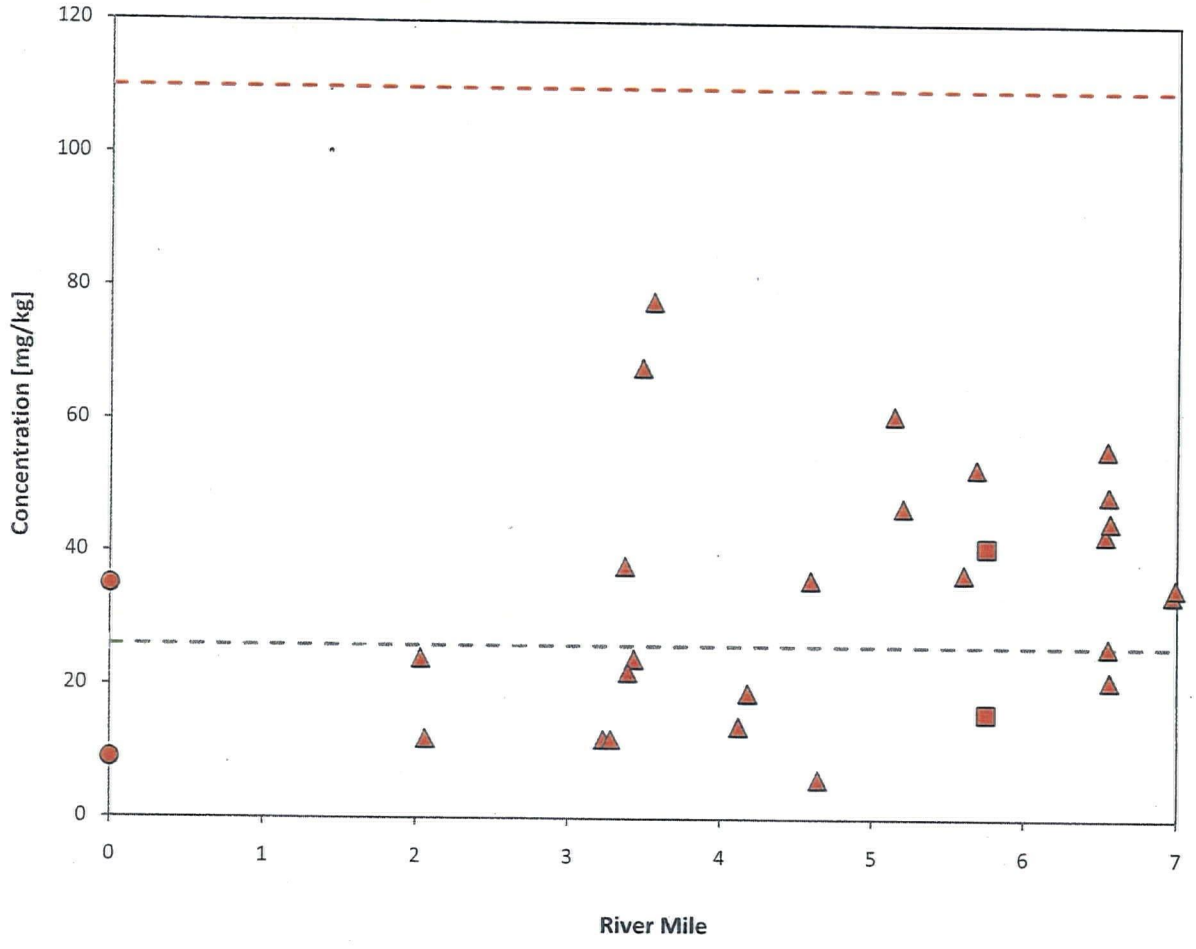
1. Severe Effects Level (SEL) for arsenic is 33 mg/kg (New Jersey Department of Environmental Protection, 1998).
2. Samples collected in Cedar Brook were plotted at River Mile 5.75.
3. Samples collected in Green Brook were plotted at River Mile 0.
4. mg/kg = milligrams/kilogram

MALCOLM PIRNIE

Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Sediment:
Total Arsenic Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
March 2009
Figure 3-4a



Colors Legend

- 1997- Bound Brook
- 1997- Green Brook
- 1997- Cedar Brook
- Lowest Effects Level
- Severe Effects Level

Symbols Legend

- Bound Brook
- Green Brook
- Cedar brook

Notes:

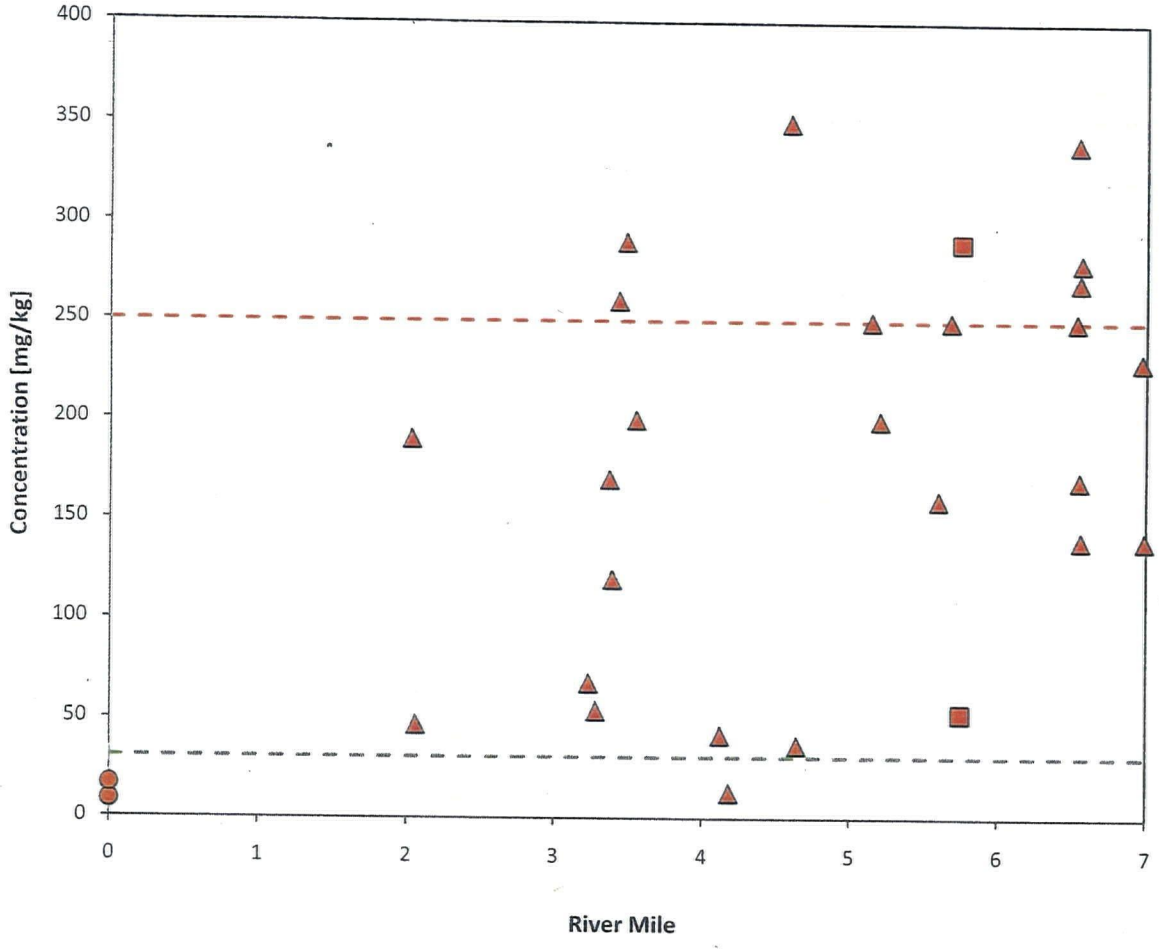
1. Samples collected in Cedar Brook were plotted at River Mile 5.75.
2. Samples collected in Green Brook were plotted at River Mile 0.
3. mg/kg = milligrams/kilogram

MALCOLM PIRNIE

Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Sediment:
Total Chromium Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
March 2009
Figure 3-4b



Colors Legend

- 1997- Bound Brook
- 1997- Green Brook
- 1997- Cedar Brook
- Lowest Effects Level
- Severe Effects Level

Symbols Legend

- Bound Brook
- Green Brook
- Cedar brook

Notes:

1. Samples collected in Cedar Brook were plotted at River Mile 5.75.
2. Samples collected in Green Brook were plotted at River Mile 0.
3. mg/kg = milligrams/kilogram

MALCOLM PIRNIE

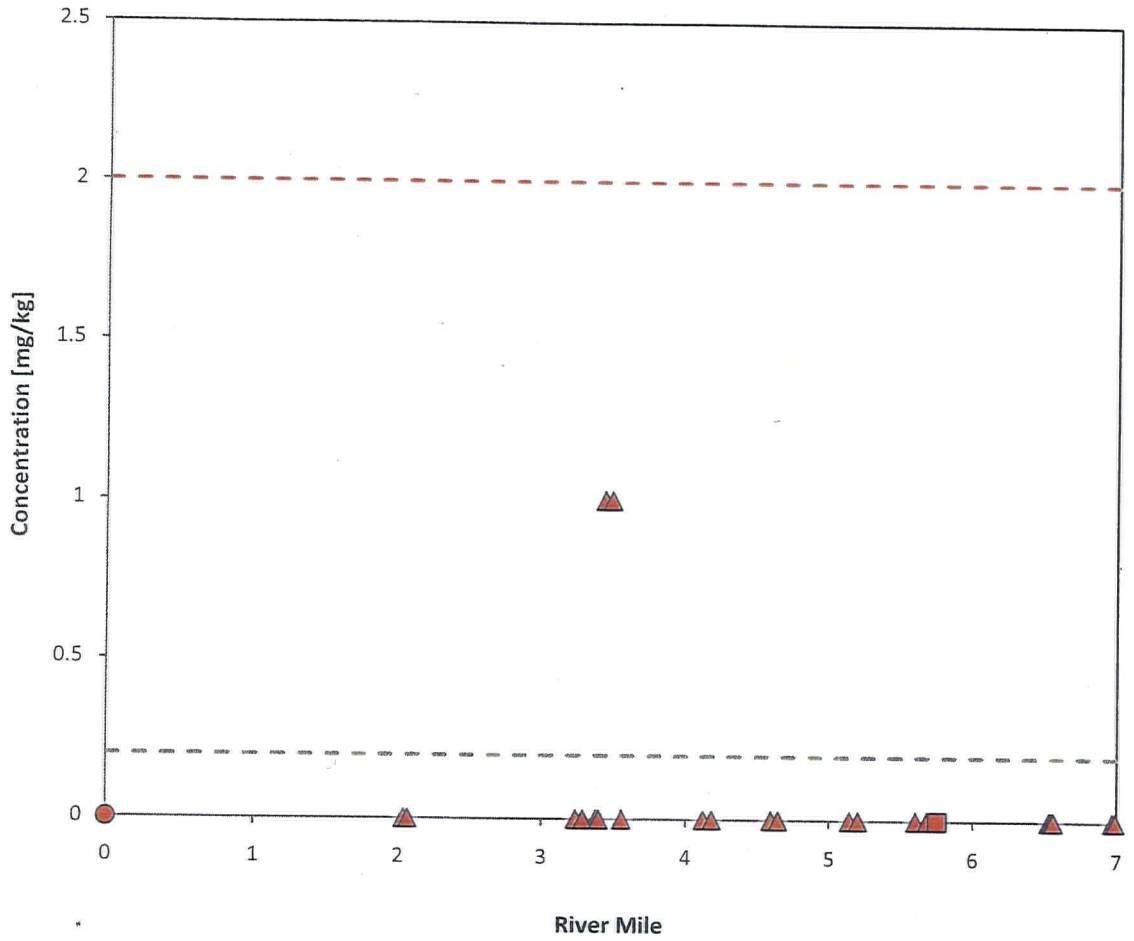
Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Sediment:
Total Lead Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.

March 2009

Figure 3-4c



Colors Legend

- 1997- Bound Brook
- 1997- Green Brook
- 1997- Cedar Brook
- Lowest Effects Level
- Severe Effects Level

Symbols Legend

- Bound Brook
- Green Brook
- Cedar brook

Notes:

1. Samples collected in Cedar Brook were plotted at River Mile 5.75.
2. Samples collected in Green Brook were plotted at River Mile 0.
3. mg/kg = milligrams/kilogram

MALCOLM PIRNIE

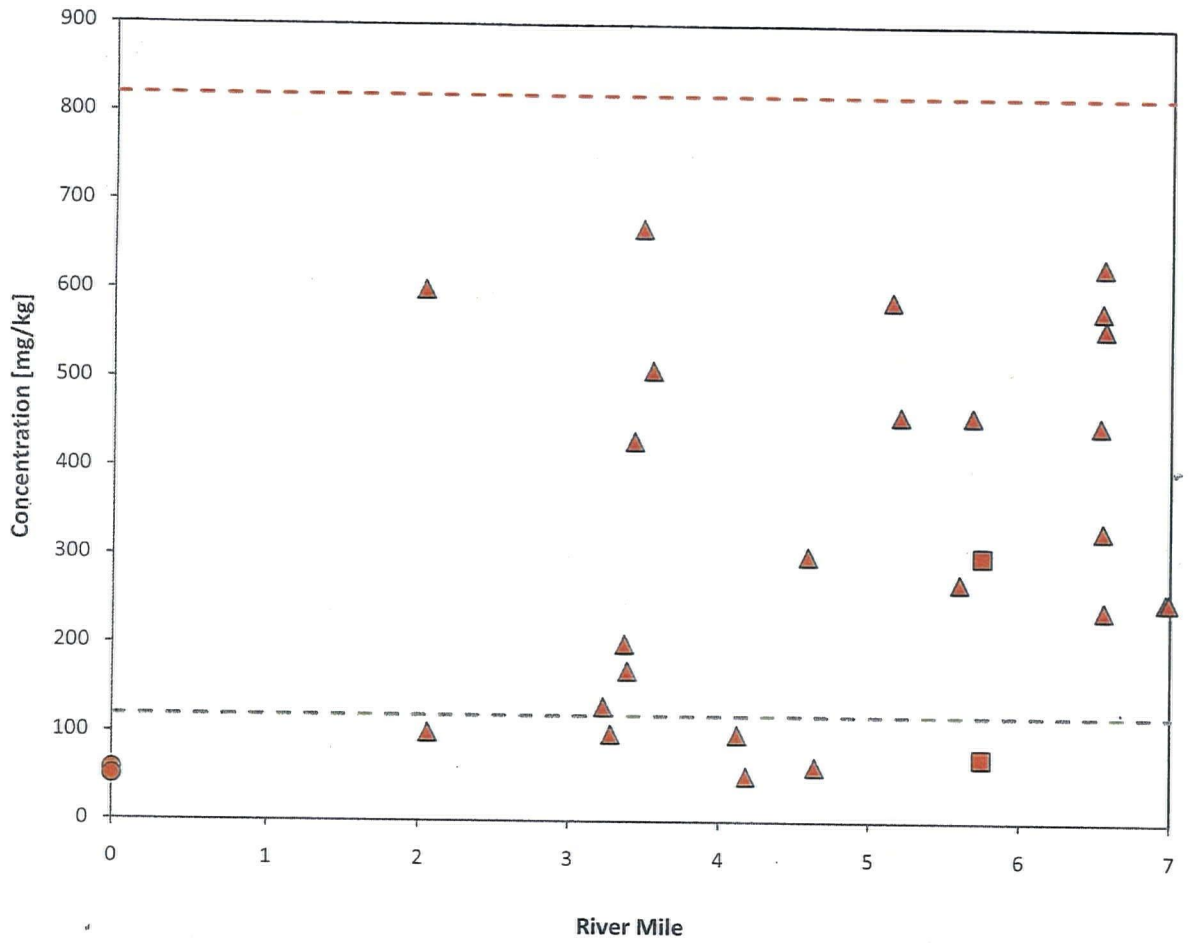
Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Sediment:
Total Mercury Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.

March 2009

Figure 3-4d



Colors Legend

- 1997- Bound Brook
- 1997- Green Brook
- 1997- Cedar Brook
- Lowest Effects Level
- Severe Effects Level

Symbols Legend

- Bound Brook
- Green Brook
- Cedar brook

Notes:

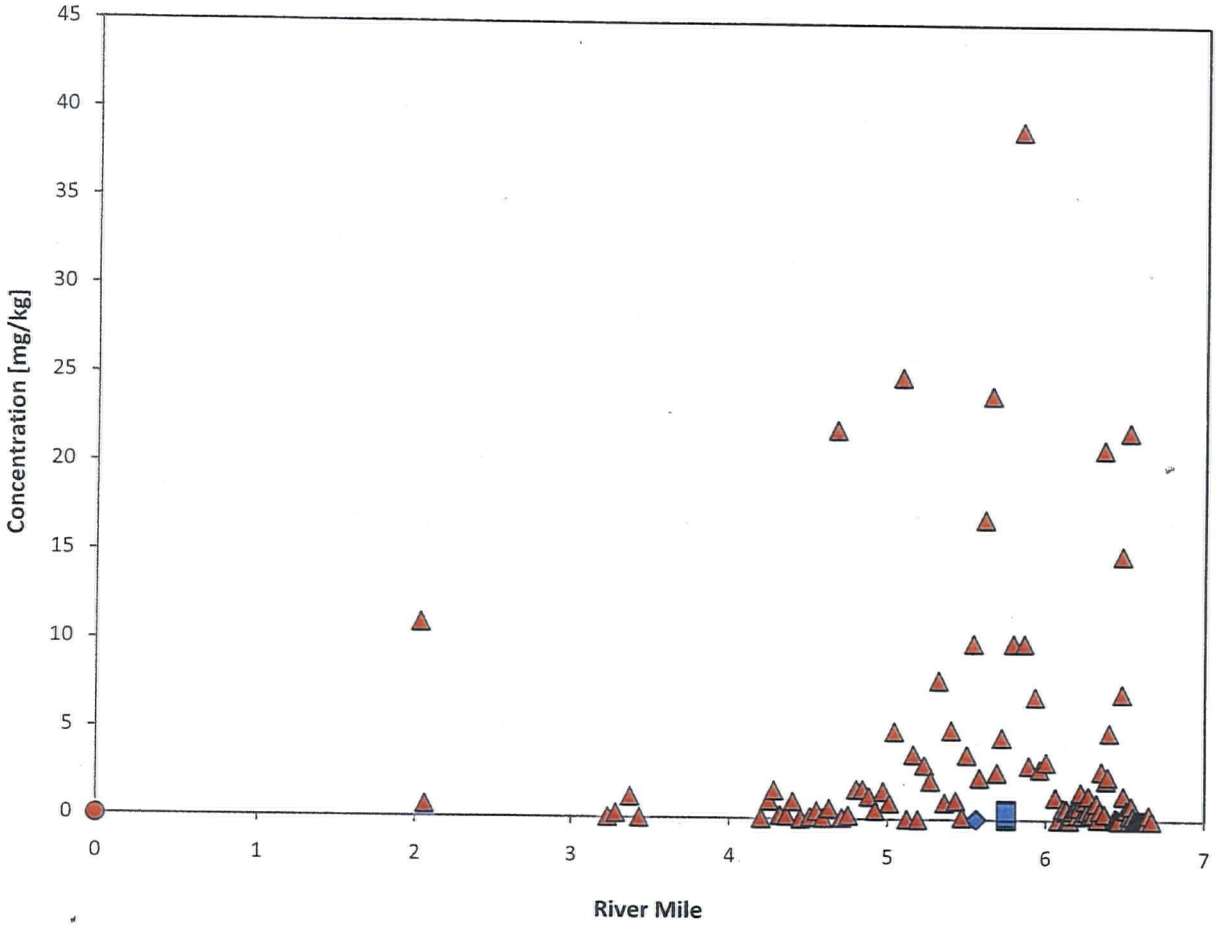
1. Samples collected in Cedar Brook were plotted at River Mile 5.75.
2. Samples collected in Green Brook were plotted at River Mile 0.
3. mg/kg = milligrams/kilogram

MALCOLM PIRNIE

Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Sediment:
Total Zinc Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
March 2009
Figure 3-4e



Colors Legend

- 1997- Bound Brook
- 1997- Green Brook
- 1997- Cedar Brook
- 1999- Cedar Brook
- 1999- Unnamed Tributaries
- 2007- Bound Brook

Symbols Legend

- Bound Brook
- Cedar brook
- Green Brook
- Unnamed Tributaries

Notes:

1. 2007 Bound Brook Sample (not shown) at River Mile 6.54 had a PCB concentration of 190 mg/kg.
2. Lowest Effects Level (LEL) for Total PCB is 0.07 mg/kg (New Jersey Department of Environmental Protection, 1998).
3. Severe Effects Level (SEL) for Total PCB is 530 mg/kg (New Jersey Department of Environmental Protection, 1998).
4. PCB = Polychlorinated Biphenyls
5. mg/kg = milligrams/kilogram

MALCOLM PIRNIE

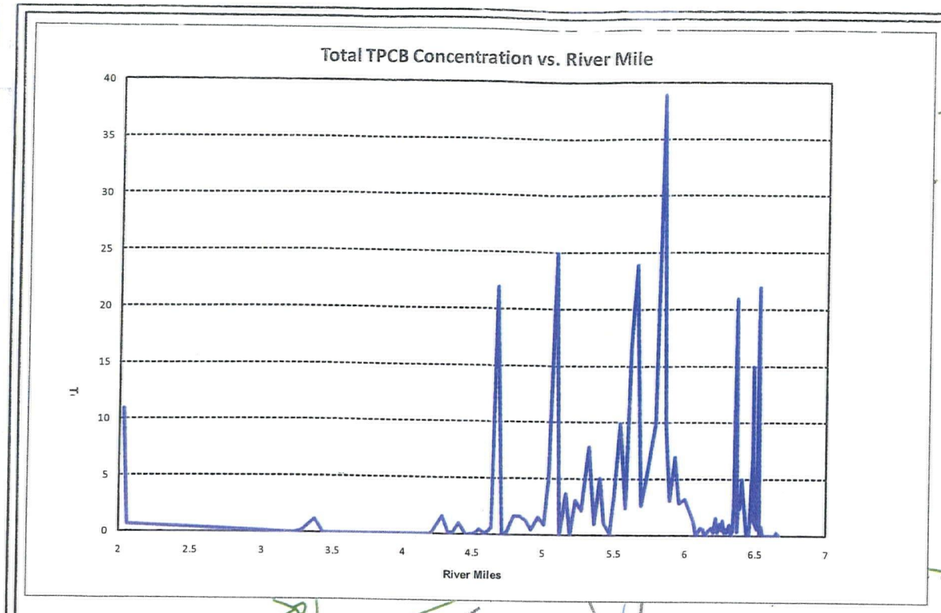
Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Sediment:
Total PCB Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.

March 2009

Figure 3-5



MALCOLM PIRNIE

Cornell-Dubilier Electronics
Superfund Site
South Plainfield, New Jersey

Surface Total PCB Concentrations for the 1997 Data in Bound Brook

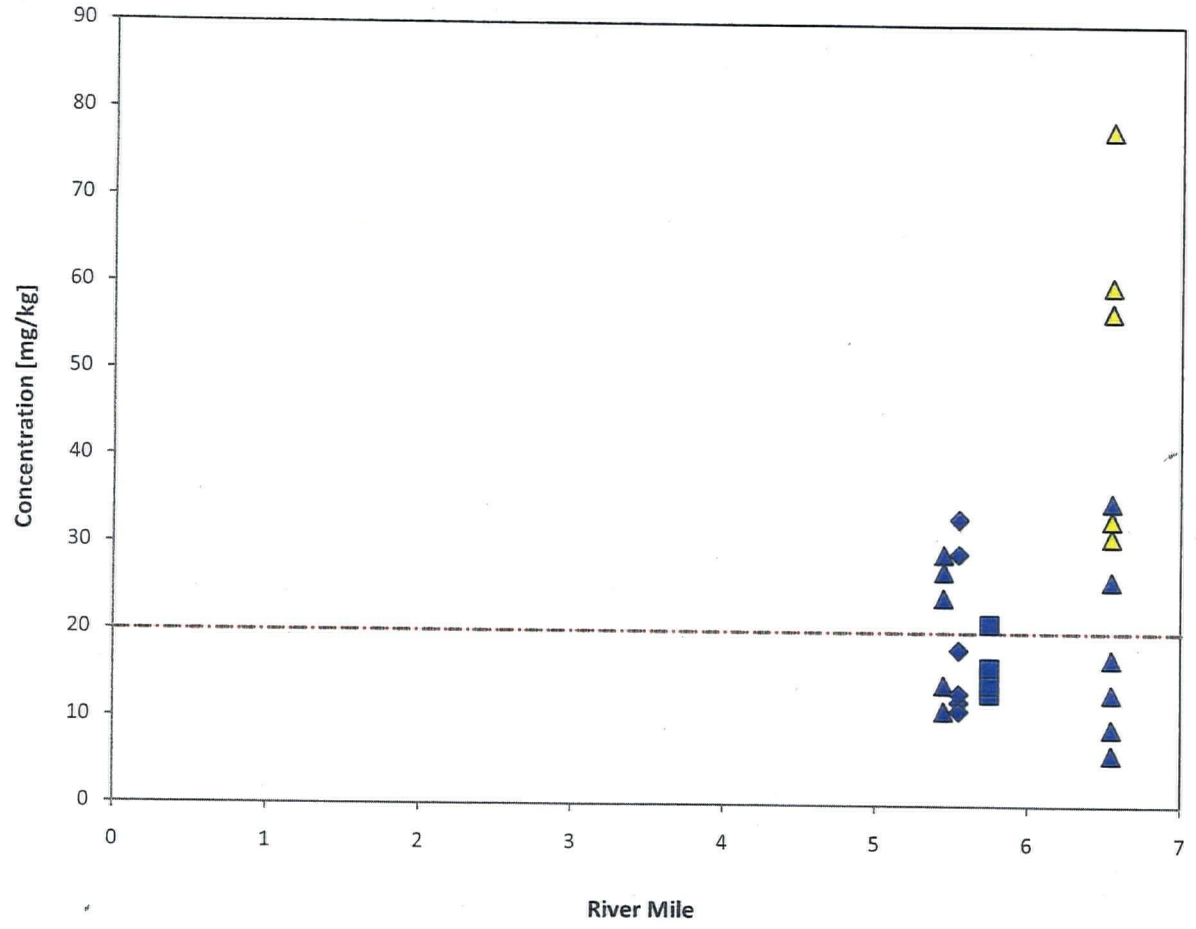
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.

MARCH 2009

FIGURE 3-6

S:\Projects\4553023\01...\MXD\...3_sfpt.mxd



Colors Legend

- 1999 - Bound Brook
- 1999 - Cedar Brook
- 1999 – Unnamed tributary
- 2000- Bound Brook
- Residential Direct Contact Criteria
- Non-residential Direct Contact Criteria

Symbols Legend

- Bound Brook
- Cedar Brook
- Green Brook
- Unnamed Tributaries

Notes:

1. Both Residential and Non-residential criteria for arsenic are 20 mg/kg (New Jersey Department of Environmental Protection, 1999).
2. mg/kg = milligrams/kilogram
3. Area 1 plots as a Bound Brook symbol at River Mile 6.55.

   Area 2 plots as a Cedar Brook symbol at River Mile 5.75.

   Area 3 plots as a Bound Brook symbol at River Mile 5.45.

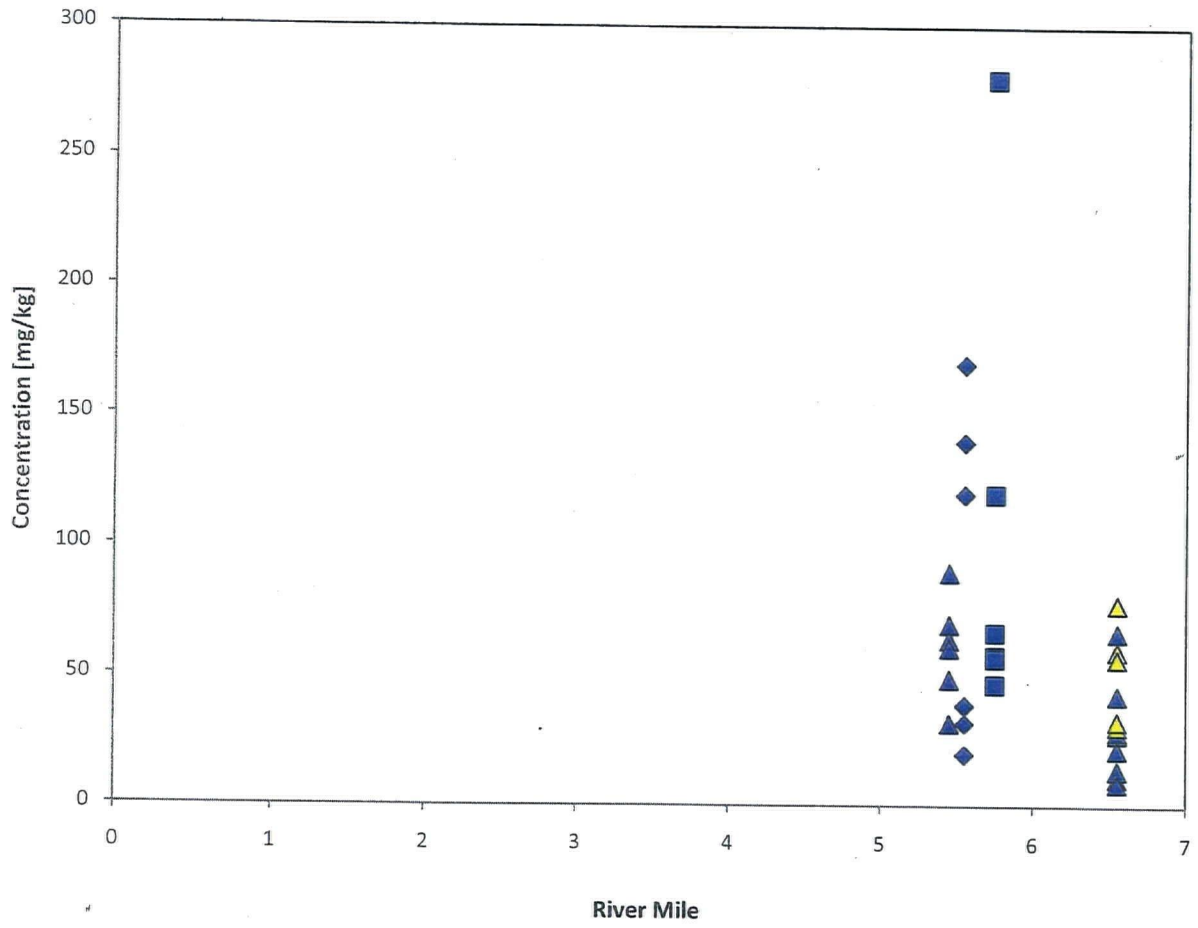
   Area 4 plots as an unnamed tributary symbol at River Mile 5.55.

MALCOLM PIRNIE

Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Soil:
Total Arsenic Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
March 2009
Figure 3-7a



Colors Legend

- 1999 - Bound Brook
- 1999 - Cedar Brook
- 1999 – Unnamed tributary
- 2000- Bound Brook

Symbols Legend

- Bound Brook
- Cedar brook
- Green Brook
- Unnamed Tributaries

Notes:

1. Residential Direct Contact Criteria for chromium is 120,240 mg/kg (New Jersey Department of Environmental Protection, 1999).
2. Non-residential Direct Contact Criteria for chromium is 6,100 mg/kg (New Jersey Department of Environmental Protection, 1998).
3. mg/kg = milligrams/kilogram
4. Area 1 plots as a Bound Brook symbol at River Mile 6.55.

   Area 2 plots as a Cedar Brook symbol at River Mile 5.75.

   Area 3 plots as a Bound Brook symbol at River Mile 5.45.

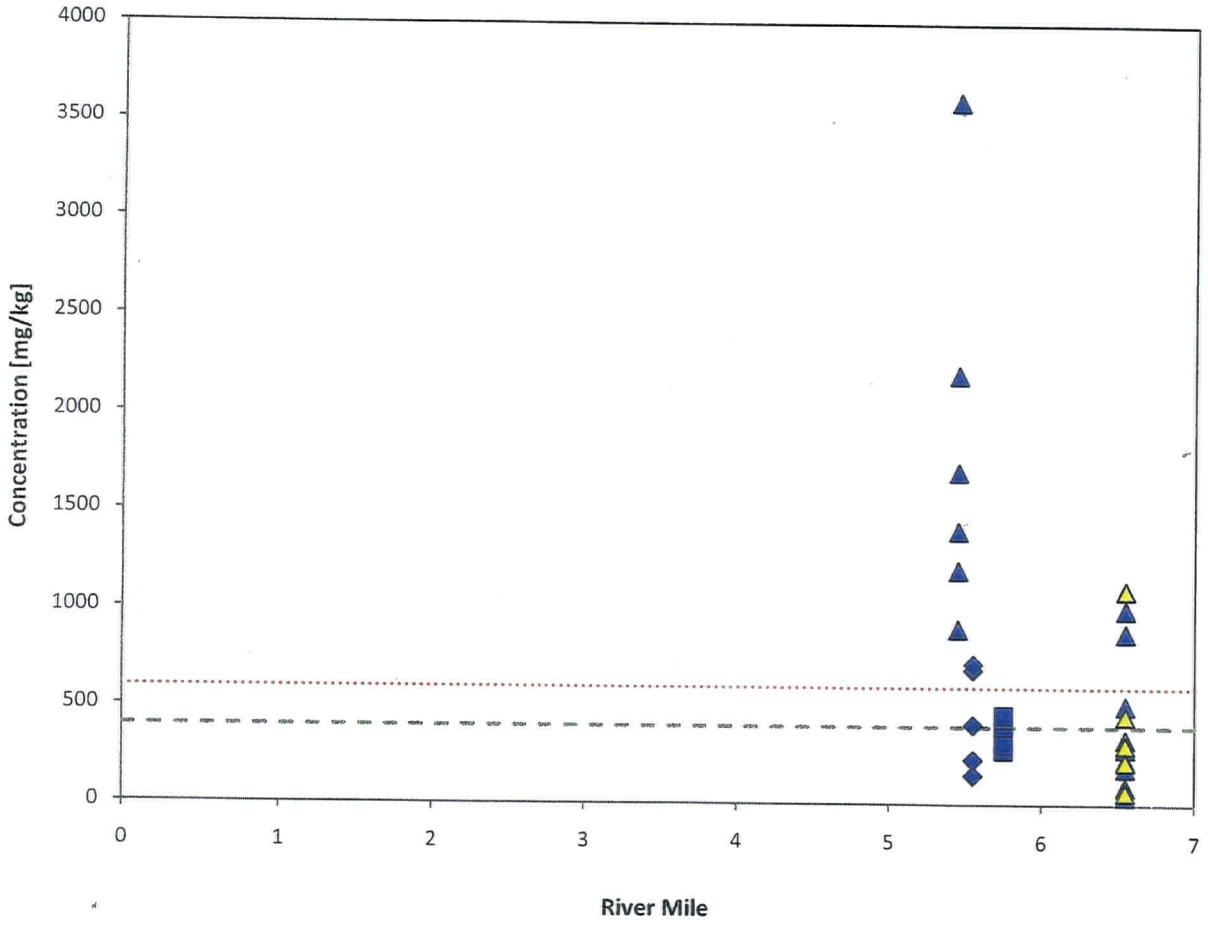
   Area 4 plots as an unnamed tributary symbol at River Mile 5.55.

MALCOLM PIRNIE

Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Soil:
Total Chromium Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
March 2009
Figure 3-7b



Colors Legend

- 1999 - Bound Brook
- 1999 - Cedar Brook
- 1999 – Unnamed tributary
- 2000- Bound Brook
- Residential Direct Contact Criteria
- Non-residential Direct Contact Criteria

Symbols Legend

- Bound Brook
- Cedar brook
- Green Brook
- Unnamed Tributaries

Notes:

1. 1999 Bound Brook samples at RM4.55 (not shown) had a PCB concentration of 3,600 mg/kg.
2. mg/kg = milligrams/kilogram
3. Area 1 plots as a Bound Brook symbol at River Mile 6.55.

   Area 2 plots as a Cedar Brook symbol at River Mile 5.75.

   Area 3 plots as a Bound Brook symbol at River Mile 5.45.

   Area 4 plots as an unnamed tributary symbol at River Mile 5.55.

MALCOLM PIRNIE

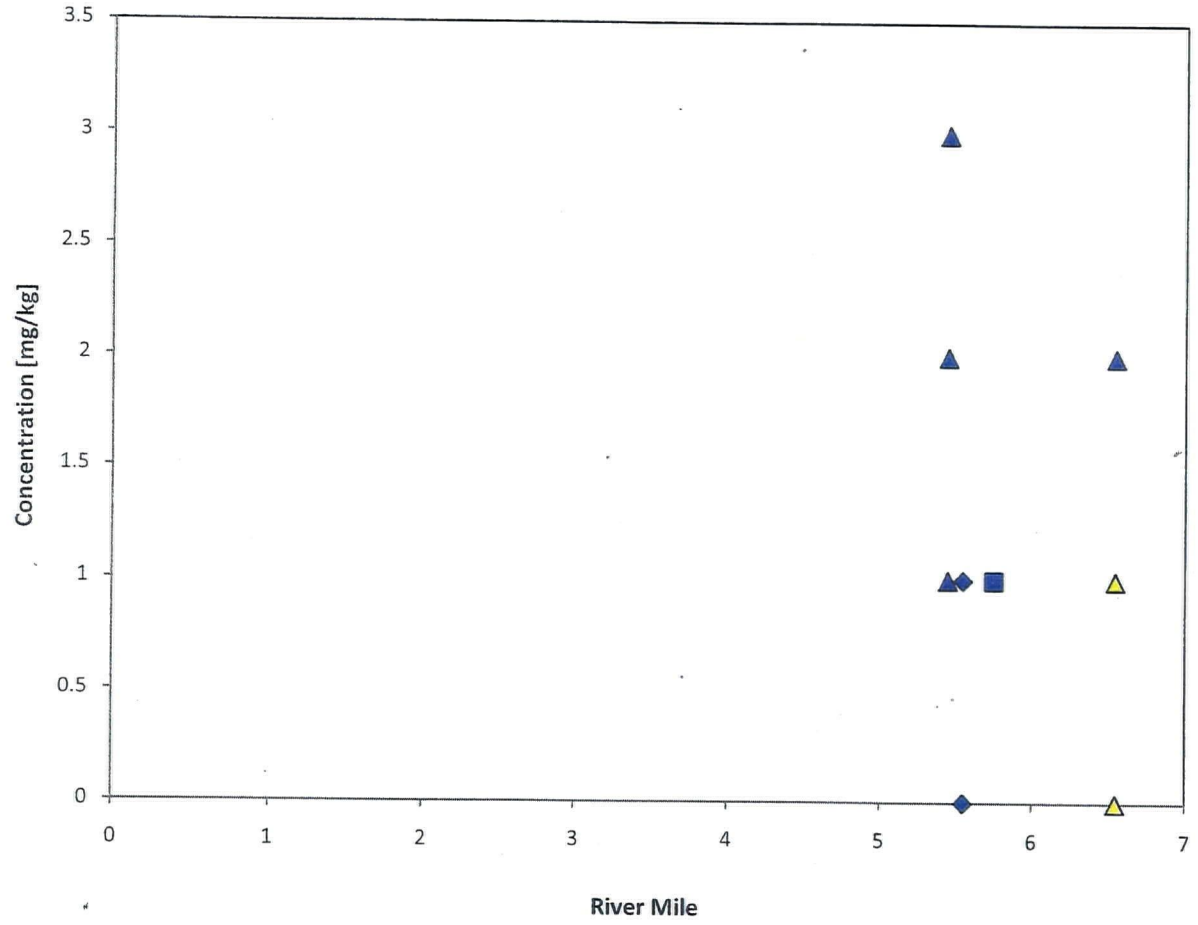
Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Soil:
Total Lead Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.

March 2009

Figure 3-7c



Colors Legend

- 1999 - Bound Brook
- 1999 - Cedar Brook
- 1999 – Unnamed tributary
- 2000- Bound Brook

Symbols Legend

- Bound Brook
- Cedar brook
- Green Brook
- Unnamed Tributaries

Notes:

1. Residential Direct Contact Criteria for mercury is 14 mg/kg (New Jersey Department of Environmental Protection, 1999).
2. Non-residential Direct Contact Criteria for mercury is 270 mg/kg (New Jersey Department of Environmental Protection, 1998).
3. mg/kg = milligrams/kilogram
4. Area 1 plots as a Bound Brook symbol at River Mile 6.55.

   Area 2 plots as a Cedar Brook symbol at River Mile 5.75.

   Area 3 plots as a Bound Brook symbol at River Mile 5.45.

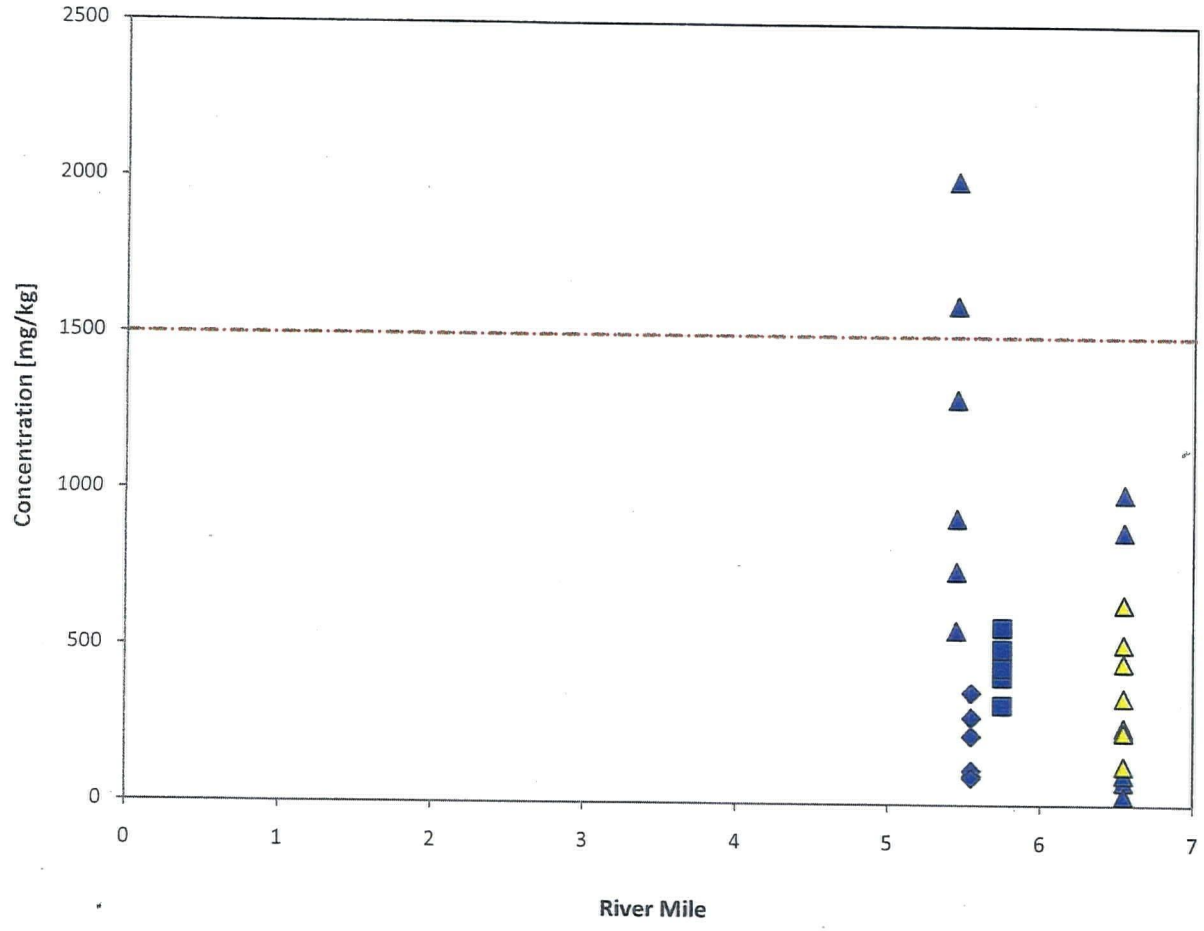
   Area 4 plots as an unnamed tributary symbol at River Mile 5.55.

MALCOLM PIRNIE

Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Soil:
Total Mercury Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
March 2009
Figure 3-7d



Colors Legend

- 1999 - Bound Brook
- 1999 - Cedar Brook
- 1999 – Unnamed tributary
- 2000- Bound Brook
- Residential Direct Contact Criteria
- Non-residential Direct Contact Criteria

Symbols Legend

- Bound Brook
- Cedar brook
- Green Brook
- Unnamed Tributaries

Notes:

1. Both Residential and Non-residential criteria for zinc are 1500mg/kg (New Jersey Department of Environmental Protection, 1999).
2. mg/kg = milligrams/kilogram
3. Area 1 plots as a Bound Brook symbol at River Mile 6.55.

   Area 2 plots as a Cedar Brook symbol at River Mile 5.75.

   Area 3 plots as a Bound Brook symbol at River Mile 5.45.

   Area 4 plots as an unnamed tributary symbol at River Mile 5.55.

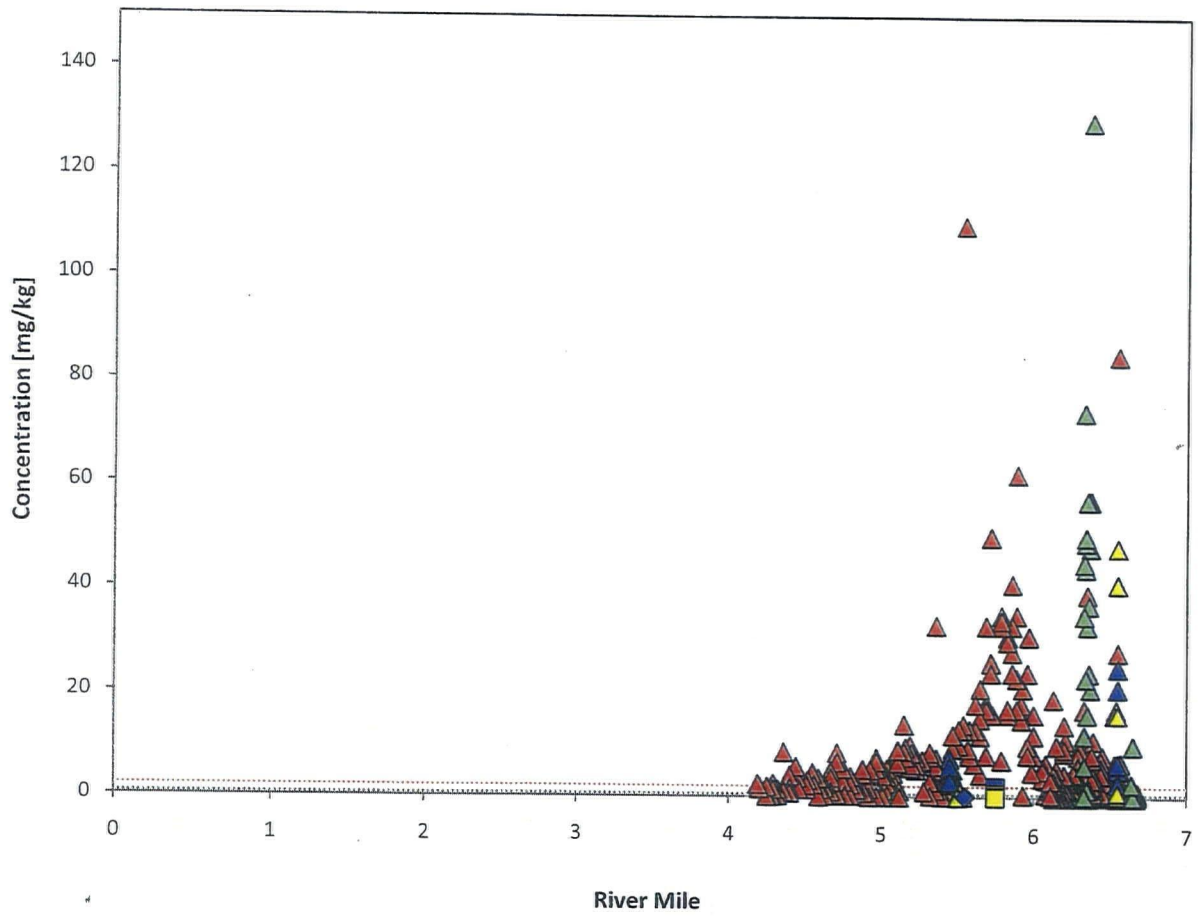
MALCOLM PIRNIE

Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Soil:
Total Zinc Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.

March 2009
Figure 3-7e



Colors Legend

- 1997 - Bound Brook
- 1999- Bound Brook
- 2000 – Bound Brook
- 2007-2008 – Bound Brook
- 1999 – Cedar Brook
- 2000 - Cedar Brook
- 1999 – Unnamed tributary
- Residential Direct Contact Criteria
- Non-residential Direct Contact Criteria

Symbols Legend

- Bound Brook
- Cedar brook
- Green Brook
- Unnamed Tributaries

Notes:

1. PCB = Polychlorinated Biphenyls
2. mg/kg = milligrams/kilogram
3. Two data points are not shown: 1997 Bound Brook at River Mile 6.34 (830 mg/kg); 2000 Bound Brook at River Mile 6.55 (19,000 mg/kg).
4. Area 1 plots as a Bound Brook symbol at River Mile 6.55. Area 2 plots as a Cedar Brook symbol at River Mile 5.75. Area 3 plots as a Bound Brook symbol at River Mile 5.45. Area 4 plots as an unnamed tributary symbol at River Mile 5.55.

MALCOLM PIRNIE

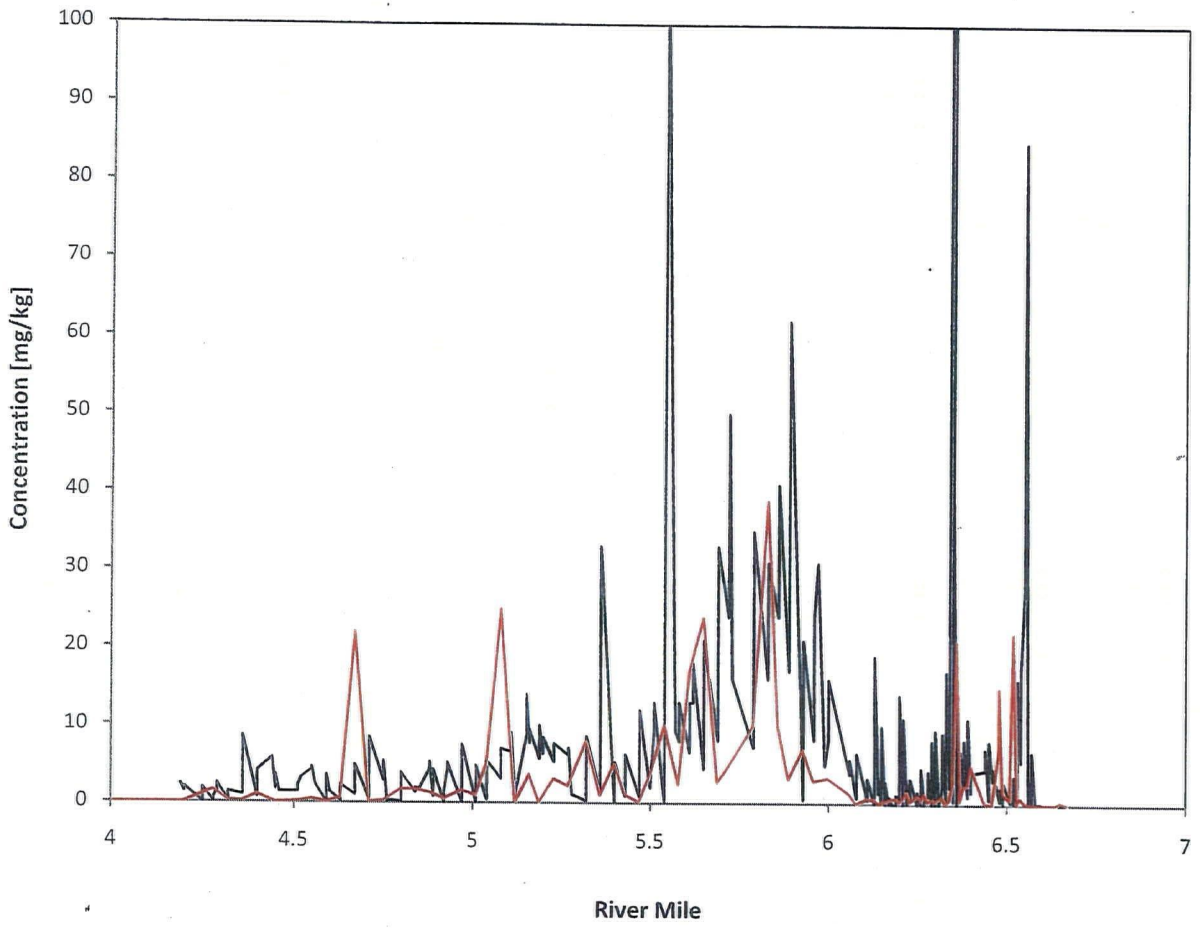
Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Soil:
Total PCB Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.

March 2009

Figure 3-8



Legend

- 1997 - Bound Brook - Soil
- 1997 – Bound Brook - Sediment

Notes:

1. PCB = Polychlorinated Biphenyls
2. mg/kg = milligrams/kilogram
3. Two soil data points are not shown: 1997 Bound Brook at River Mile 6.34 (830 mg/kg); 2000 Bound Brook at River Mile 6.55 (19,000 mg/kg).

MALCOLM PIRNIE

Cornell-Dubilier Electronics Superfund Site
South Plainfield, New Jersey

Surface Soil and Surface Sediment: Total PCB Concentration vs River Mile
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
March 2009
Figure 3-9

Map Document: (S:\Projects\4553023\OU4\MXDs\Other_Potential_Sources.mxd)
4/2/2009 – 3:10:04 PM

EPA Monitor Well
Site Monitor Well
USEPA Superfund Sites
NJDEP Known Contaminated Sites
CERCLIS Facilities

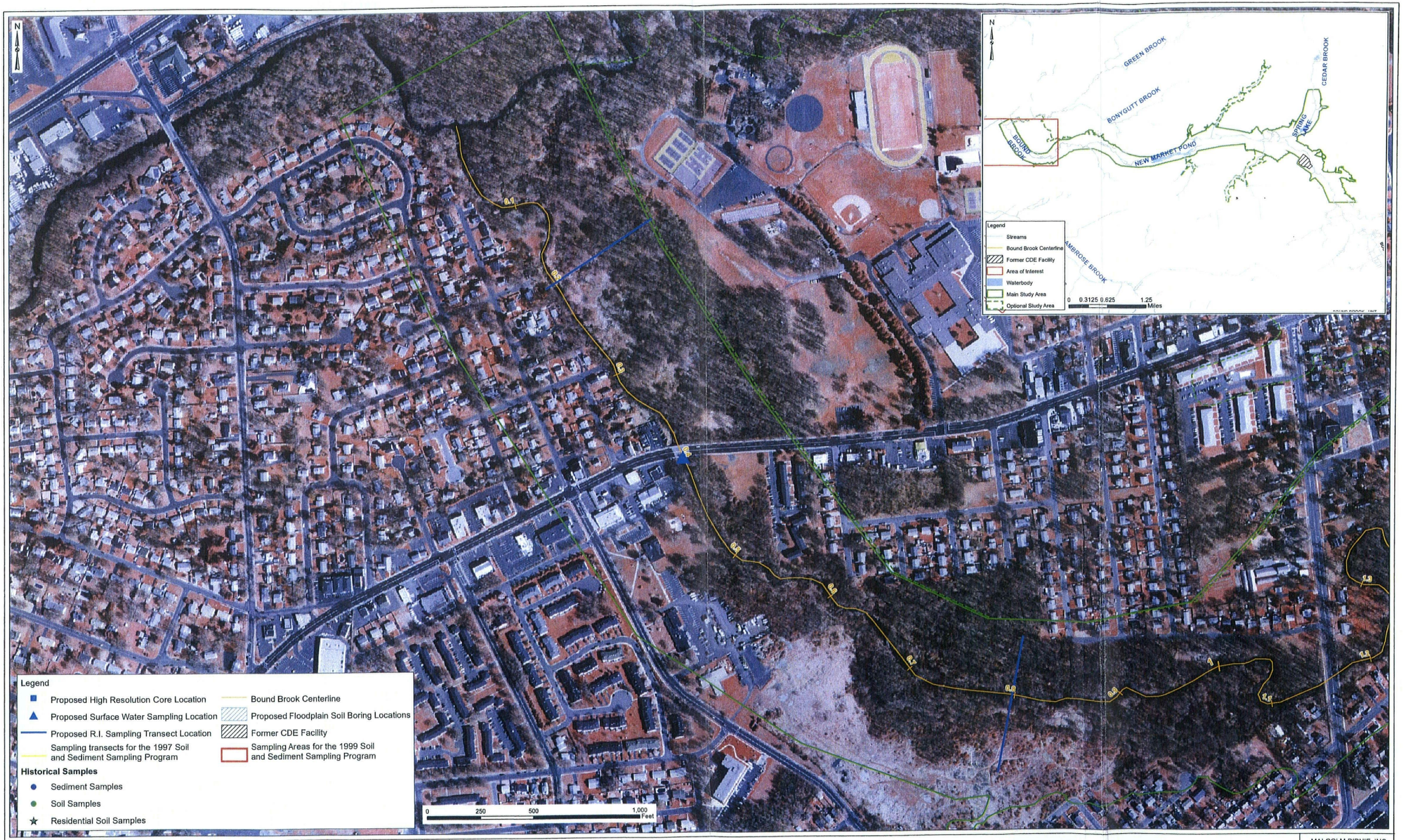
0 500 1,000 2,000 3,000 4,000 Feet

MALCOLM PIRNIE

Cornell-Dubilier Electronics
Superfund Site
South Plainfield, New Jersey

Location Of Other Potential Sources
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
April 2008
FIGURE 3-10

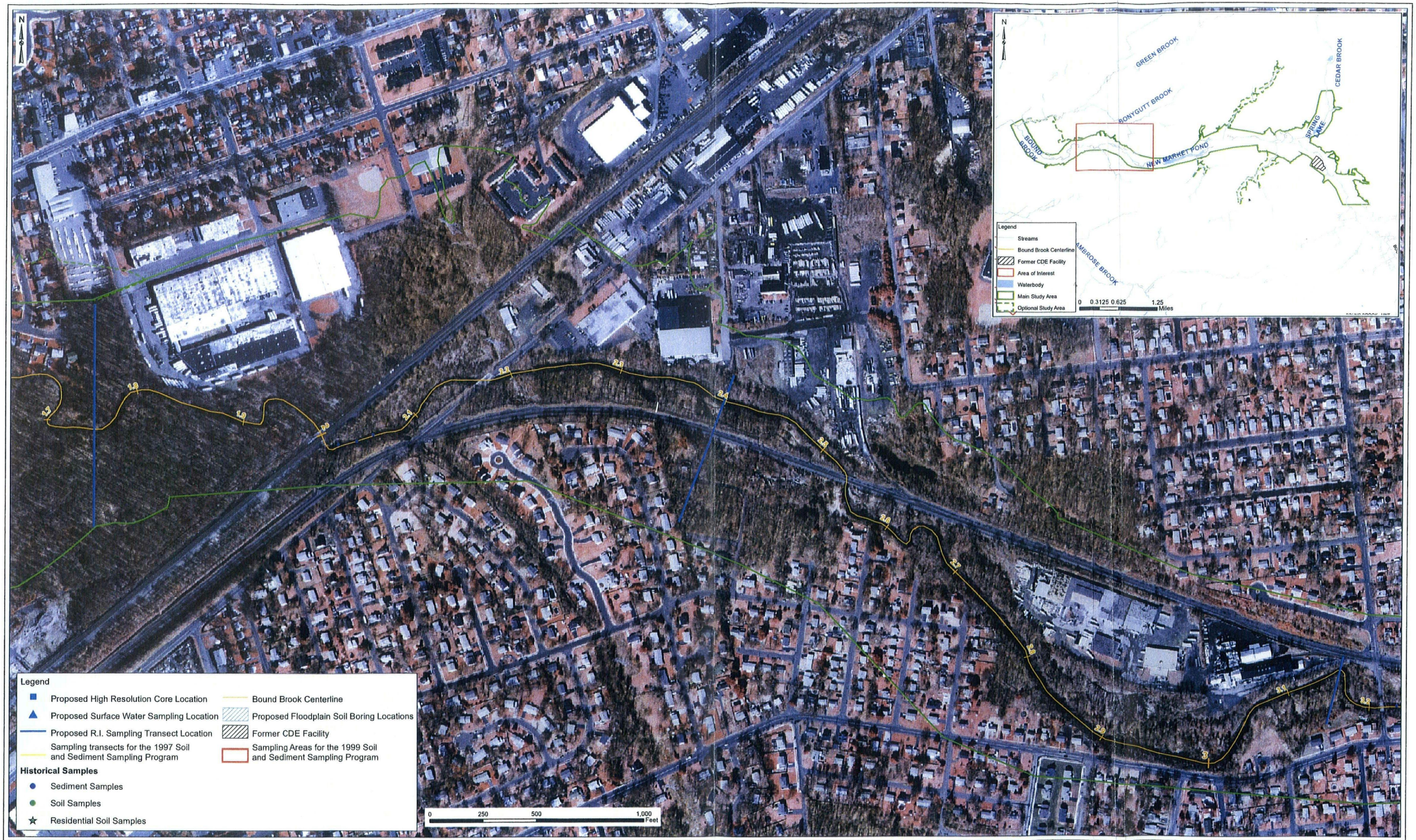


MALCOLM PIRNIE

Cornell-Dubilier Electronics
Superfund Site
South Plainfield, New Jersey

Historical and Proposed Sampling Locations for the Soil and Sediment Sampling Program
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
MARCH 2009
FIGURE 3-11a

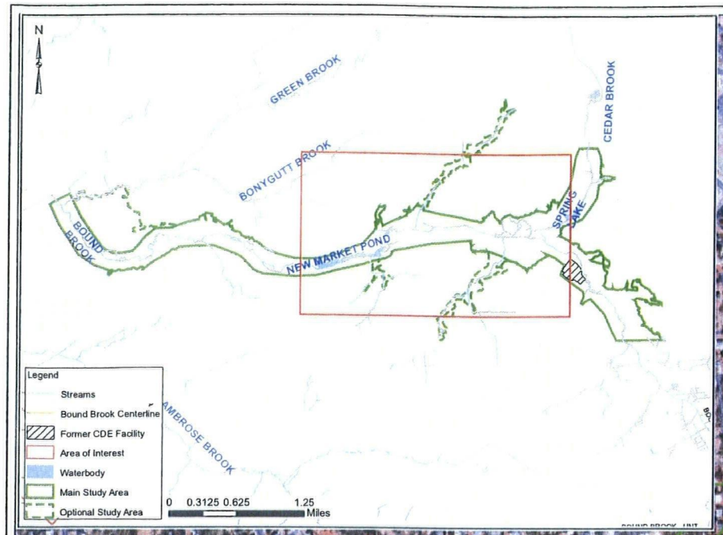


MALCOLM PIRNIE

Cornell-Dubilier Electronics
Superfund Site
South Plainfield, New Jersey

Historical and Proposed Sampling Locations for the Soil and Sediment Sampling Program
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
MARCH 2009
FIGURE 3-11b

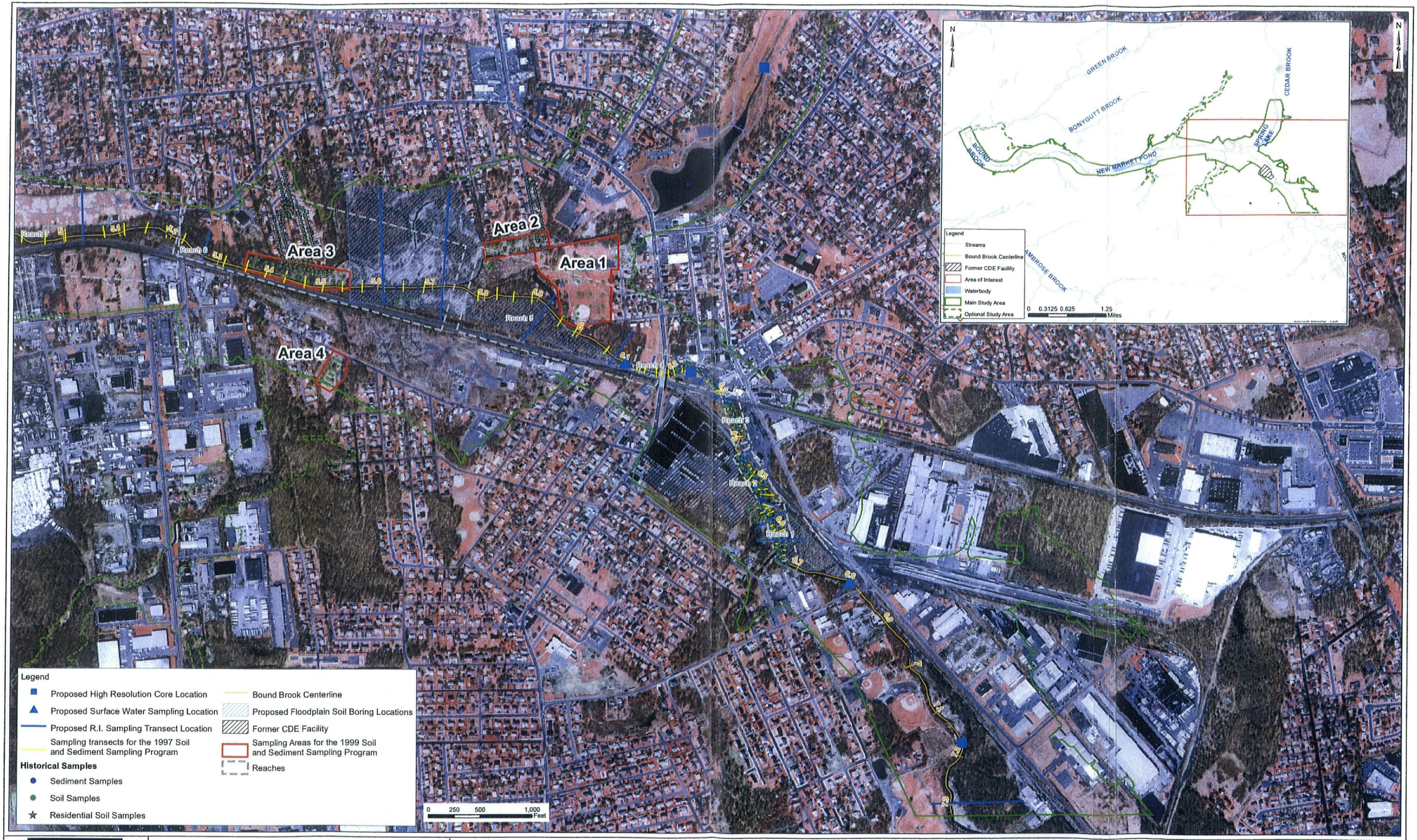


MALCOLM PIRNIE

Cornell-Dubilier Electronics
Superfund Site
South Plainfield, New Jersey

Historical and Proposed Sampling Locations for the Soil and Sediment Sampling Program
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
MARCH 2009
FIGURE 3-11c



MALCOLM PIRNIE

Cornell-Dubilier Electronics
Superfund Site
South Plainfield, New Jersey

Historical and Proposed Sampling Locations for the Soil and Sediment Sampling Program
OU4 Remedial Investigation/Feasibility Study

MALCOLM PIRNIE, INC.
MARCH 2009
FIGURE 3-11d

ATTACHMENT A

A limited file review was conducted on known contaminated sites within or adjacent to the Bound Brook Corridor. The files were obtained from a NJDEP file search and environmental concerns have been summarized for each site identified. The documents (including limited, associated correspondence) that are listed have been reviewed to prepare the summaries.

The summaries outlined in this section are for those sites that occur within a one quarter mile distance along the Bound Brook Corridor. They represent the most proximal sites that have the potential to be contributing contaminants via a single or multiple migration pathways to the Bound Brook Corridor.

The listed concentrations of contaminants are generally the maximum concentrations that triggered investigative and remedial actions at the properties. These concentrations were used to assess the worst-case contributions of contaminants to the local soils and groundwater, and potentially to the Bound Brook Corridor.

Woodbrook Road Dump (aka Dismal Swamp), Woodbrook Road, South Plainfield, NJ

The Woodbrook Road Dump site is an inactive, illegal dumping area of approximately 70 acres. The Superfund site is located on two properties north of Woodbrook Road. It is heavily wooded and undeveloped, and is bordered by the Bound Brook and wetlands of the Dismal Swamp. These two properties were operated as illegal dumps by previous owners in the 1940s and 1950s. Household and industrial wastes were accepted until the dump was shut down by the State of New Jersey in 1958. The current owner is Texas Eastern Transmission Corporation.

The Site is being addressed through federal (EPA) and potential responsible parties' actions. Partially buried leaking capacitors were discovered in September 1999. In 2000, a removal action was completed to address these buried capacitors. Subsequently, a soil investigation revealed soils and sediments contaminated with high levels of inorganics, VOCs and PCBs. The groundwater is also contaminated with inorganics, VOCs and PCBs.

CP Manufacturing (Aka Kentile Floors), 101 Kentile Road, South Plainfield, NJ

An RI Report dated March 1997 had approximately 16 Areas of Concern (AOCs) were noted in the investigation. The property was used to manufacture rubber and vinyl floor tiles for residential and commercial use.

Soils on the property were found to be contaminated with SVOCs at a maximum of 526 mg/kg, including butylbenzylphthalate, bis (2-ethylhexyl) phthalate, and di-n-octylphthalate. Several PAHs were detected at low levels, below the New Jersey Soil Cleanup Criteria (NJSCC). Maximum VOCs totaled 95.5 mg/kg and included chloroethene, benzene, and toluene. Total petroleum hydrocarbons (TPH) were detected at a maximum concentration of 17,600 mg/kg. Metals, including cadmium (64.6 mg/kg), lead (3,640 mg/kg) and zinc (5,720 mg/kg), were also detected in the soil.

Groundwater samples indicated levels of chlorinated solvents, including 1,2-DCE, tetrachloroethene (PCE), and TCE above the New Jersey Groundwater Quality Standards (NJGWQS). 1,2-DCE was detected at 2.2 ug/L, PCE at 4.6 ug/L, and TCE at 160 ug/L.

No other information detailing environmental contamination was reviewed for this property. While this site may have the potential to contribute VOCs, SVOCs, TPH and metals to the Bound Brook Corridor, it is not considered a significant contributor of organochlorine compounds.

Eco Pump Corporation, 2387 South Clinton Avenue, South Plainfield, NJ

Soils contaminated with VOCs were removed in 1987, under the NJDEP Bureau of Industrial Site Evaluation. A remedial cleanup plan, dated September 1990 addressed contamination caused by former machining operations. The property was used to manufacture liquid transfer pumps and the use of cutting oils and solvents was common. In 1993, groundwater treatment by a pump and treat system has been in operation since February 2002.

A groundwater plume consisting of VOCs, including benzene, toluene, ethyl benzene, and xylene (BTEX) and chlorinated solvents (including carbon tetrachloride, 1,1-DCE, 1-2, DCE, MTBE, TCE, and vinyl chloride) was identified. During early investigation activities, TCE was detected at 370,000 ug/L and 1-2, DCE at 7,200 ug/L. BTEX has been detected at high concentrations in the more recent groundwater sampling activities. Benzene was detected at 1,531 ug/L, toluene at 13,006 ug/L, ethylbenzene at 8,020 ug/l and xylene at 21,402 ug/L.

No other information detailing environmental contamination was reviewed for this property. While this site may have the potential to contribute VOCs to the Bound Brook Corridor, it is not considered a significant contributor of organochlorine compounds.

Hmieleski Trucking, 108 New Era Drive, South Plainfield, NJ

An RI Report dated February 2000 and a RAWP dated March 2003 was reviewed.

Soil contamination was detected at the location of several diesel, gasoline and waste oil USTs. Soil samples from the UST areas indicated BTEX and PCE exceeded the NJSCC. Soil borings collected from the oil-water separators identified chromium exceeding the NJSCC and elevated TPH levels at the discharge pipe. A waste trench and fill material on the property were found to be contaminated with beryllium and/or chromium in excess of the NJSCC. Samples also indicated elevated levels of TPH. Groundwater samples near the former USTs and oil-water separators indicated BTEX and MTBE were above the NJGWQS.

No other information detailing environmental contamination was reviewed for this property. While this site may have the potential to contribute VOCs, TPH, and metals to the Bound Brook Corridor, it is not considered a significant contributor of organochlorine compounds.

Crown Bullion and Refining Co. (Aka Non-Ferrous Metals), 304 Pulaski Street, South Plainfield, NJ

An RI Report dated October 2001 was reviewed. The report details 16 AOCs which include underground storage tanks (USTs), above ground storage tanks (ASTs), piping, chemical and waste storage, transformer/capacitors, smelting furnaces, laboratories, lagoons, and material loading areas. Historically, the property was used by a variety of companies that refined and recycled precious metals.

Metals, TPH, and PAHs were detected in soil in excess of the NJSCC. Silver was detected at 779 mg/kg, copper at 5,110 mg/kg, and cadmium at 254 mg/kg. TPH was detected at 123,000 mg/kg. PCBs were also detected in soil at 2.8 mg/kg. Several contaminants detected in groundwater were in excess of the NJGWQS. Elevated concentrations of metals were as follows: arsenic (1,020 ug/L); chromium (1,030 ug/L); copper (38,000 ug/L); mercury (15.7 ug/L); nickel (1,120 ug/L); selenium (612 ug/L); lead (7,350 ug/L); zinc (8,140 ug/L); cadmium (3,590 ug/L); and antimony (769 ug/L). Concentrations of VOCs were: benzene (33 ug/L) TCE (1.3 ug/L), PCE (1.4 ug/L) and xylene (89 ug/L).

No other information detailing environmental contamination was reviewed for this property. While this site may have the potential to contribute PAHs and metals to the Bound Brook Corridor, it may be considered a contributor of organochlorine compounds.

United Steel Deck, 14 Harmich Road, S. Plainfield, NJ

The property was used to fabricate steel decking for use in building construction by United Steel. Multiple AOCs were identified with being associated with the manufacturing process by the NJDEP. An RI report was prepared in October 2005 for the multiple AOCs identified.

Eight groundwater monitoring wells were sampled at the property. VOCs detected in the groundwater were benzene at 3.1 ug/L and chlorobenzene at 83.0 ug/L, both at levels above the NJGWQS. No SVOCs were detected in exceedance of the NJGWQS.

Several metals were detected in the groundwater above the NJGWQS, including arsenic, aluminum, cadmium, iron, lead, manganese, and sodium. Arsenic concentrations were detected at a maximum of 28.2 ug/L. Cadmium contamination was detected at a maximum of 60.7 ug/L, and lead at 26.6 ug/L. Historically, cadmium and lead have not been detected above NJSCC values in soil samples.

No other information detailing environmental contamination was reviewed for this property. While this site may have the potential to contribute metals to the Bound Brook Corridor, it is not considered a significant contributor of organochlorine compounds.

Chevron Chemical Company, LLC (Also Adjacent Abramson Property), Former Ortho Products Facility, South Plainfield, NJ

This property was used to formulate and package liquid and solid pesticides, herbicides, fungicides, and fertilizers. Formulating and packing operations were conducted on the property from 1952 through 1985. In 1985, the formulation and packing operations ceased, and the property was used solely as a warehouse.

- *Preliminary Assessment for RCRA Corrective Action Program, Chevron Chemical Co, Ortho Division, South Plainfield, New Jersey, dated November 1985, prepared by the Division of Waste Management, Bureau of Hazardous Waste Planning and Classification, USEPA*

The Preliminary Assessment stated eight solid waste management units were identified at the Chevron facility. The assessment also identified several AOCs. Buried disposal sites were noted to contain arsenic and the pesticides DDT, DDD, dieldrin, and chlordane. Impacts to groundwater from benzene and xylene were also noted. Elevated levels of chlordane and toxaphene were reported in the railroad loading area soils. Soil and groundwater samples were found to contain chlordane, hexachlorobenzene, DDT, DDD, xylene and other organic chemicals.

- *A Site Inspection Report dated March 21, 1990 prepared by NUS Corporation for the Environmental Services Division, United States Environmental Protection Agency (USEPA)*

A Site Inspection Report was prepared to address potential release of hazardous materials. Hazardous waste waters were generated by washing down blending and formulating tanks with water and occasionally solvents. The waste water contained dilute methoxyclor, lindane, arsenic, and toxaphene. These wastes were drummed for off site disposal. An unlined disposal pond was filled in the early 1970s. Prior to that, the disposal pond received runoff from the drum storage area and storage tank area via a drainage ditch.

An abandoned septic leach field was reportedly used for sanitary waste disposal from the property. Low levels of pesticides were detected in the soil of the abandoned leach field. An incinerator was reportedly used for the burning of garbage and cardboard, but analysis indicated high levels of pesticides in samples collected at the former incinerator.

Soil samples collected from the property for the period of 1979 to 1989 indicated the presence numerous contaminants. Maximum concentrations of the following contaminants were detected in the soil: arsenic (29 mg/kg); cadmium (0.9 mg/kg); copper (25 mg/kg); barium (116 mg/kg); lead (159 mg/kg); mercury (25 mg/kg); zinc (156 mg/kg); chlordane (5,900 mg/kg); lindane (38.8 mg/kg); hexachlorobenzene (3.5 mg/kg); 4.4'-DDE (140 mg/kg); DDD (417 mg/kg); DDT (920 mg/kg); toxaphene (50,650 mg/kg); benzene (0.055 mg/kg); chlorobenzene (14.5 mg/kg); ethylbenzene (106 mg/kg); and xylene (555 mg/kg).

Groundwater samples collected from 1979 through March 1987 indicated the presence of various organic and inorganic contaminants. Concentrations of the following contaminants were detected in the groundwater samples: arsenic (200 ug/L); copper; pentachlorophenol (23 ug/L); lindane (6

ug/L); benzene (53.1 ug/L), ethylbenzene (8.96 ug/L); and toluene (8.48 ug/L). Isophorone, carbon tetrachloride, and dieldrin were also detected in the groundwater. Drainage ditches on the property flow directly into an unnamed tributary of Bound Brook. This tributary, located approximately 1,200 feet southeast of the property, flows west into the channel of Bound Brook.

- *Final Report Assessment of Storm Water Runoff Data and Potential Environmental And Human Health Effects from Chevron Chemical Company's South Plainfield, New Jersey, Facility, dated December 1983, prepared by Versar Inc.*

Storm water runoff samples were collected during two storm episodes in 1983. All detections occurred at locations either exiting or downstream of the Chevron property. Arsenic and copper were detected at concentrations of 44 ug/L and 31 ug/L, respectively. Benzene and 1,1-DCE were detected at concentrations of 4 ug/L and 6 ug/L, respectively. Chlordane and pramitol were detected at 110 ug/L and 22 ug/L. Pramitol was noted at high concentrations (570 ug/L) at an upstream location.

- *Supplemental Remedial Investigation Report Addendum, dated July 2003, prepared by Blasland, Bouck & Lee, Inc..*

The Supplemental RI Report was prepared to present additional soil and groundwater investigation results from the former Chevron property. The investigation activities were performed to delineate chlordane in soils, and determine the presence of potential NAPL in subsurface soil in the vicinity of former source areas.

Horizontal delineation indicated chlordane contamination was present at concentrations slightly above the NJSCC past the property boundaries. Depths of contamination ranged from 6.5 to 24 feet bgs. Chlordane (17 mg/kg), dieldrin (0.39 mg/kg), and heptachlor (0.43 mg/kg) were detected in the vertical delineation soil samples.

The NAPL investigation determined no VOCs and SVOCs were detected above the Residential Direct Contact NJSCC for the soil. Ethylbenzene, xylene, 1,2,4-trichlorobenzene, naphthalene, and hexachlorobutadiene were the only compounds with detectable levels.

Passive groundwater sampling in the suspected NAPL areas indicated several VOCs (1,1,2-TCE, benzene, chlorobenzene, ethylbenzene, and xylene) were at concentrations above NJGWQS. Also, concentrations of pesticides (BHC, chlordane, DDD, DDE, dieldrin, endosulfan I , and endrin) were above the NJGWQS.

No other information detailing environmental contamination was reviewed for this property. Results of the file review identified this site as a potential source of organochlorine compounds, in the form of organochlorine pesticides, VOCs, metals and arsenical-based herbicides, to the Bound Brook Corridor.

Gasoline/Fuel Underground Storage Tank Sites

Several properties within or adjacent to the Bound Brook Corridor were found to have been contaminated by underground storage tanks (USTs) containing gasoline or other petroleum fuels. The site name, address and corresponding reference document(s) that were reviewed are listed below.

Perry Technology, Inc. (Aka. A.J. Maglio, Inc.)
1253 New Market Street, South Plainfield, NJ
Remedial Investigation Report, Bell Environmental Consultants, Inc., March 1995.

Consolidated Freightways (formerly Central Transport International Inc.)
105 New Era Drive, South Plainfield, NJ
Remedial Action Work Plan, Leggette, Brashears, & Graham, Inc., June 2001.
Remedial Investigation Work Plan, Viridian Environmental Consultants, April 2005.

Hall's Fast Motor Freight, Inc. (Aka S&M Waste Oil, Inc.)
330 Oak Tree Avenue, South Plainfield, NJ
Remedial Investigation Report, A. Cameron, PG, June 5, 1995.

Former Shell Station (Owned/leased by Motiva Enterprises LLC)
90 Maple Avenue, South Plainfield, NJ
Correspondence between the NJDEP and Shell Oil Company dated April 10, 1997, regarding tank removal activities in December 1992.

South Plainfield Municipal Building
2480 Plainfield Avenue, S. Plainfield, NJ
Remedial Action Work Plan, PMK Group, January 1997.

Former Snyder Foundation Property
4201 Kennedy Road, South Plainfield, NJ
Remedial Investigation Report/Remedial Action Work Plan , Environmental Liability Management, Inc., June 1997.

Tank closure and/or removal activities have been documented at these sites. Identified contaminants within the soil and groundwater consisted mainly of VOCs, SVOCs, TPH and some metals (primarily lead). While these properties may have the potential to contribute limited VOCs, SVOCs, metals and TPH to the Bound Brook Corridor, they are not considered a significant contributor of organochlorine compounds.

The following table identifies details information on the USTs and contaminants that were present at each site in the soil and groundwater.

Site Name	Tank Information	Contaminants Above NJ Criteria	
		Soil (NJSCC)	Groundwater (NJGWQS)
Perry Technology, Inc.	Two (2) gasoline USTs	xylene	benzene, xylene, and methyl-tert butyl ether (MTBE)
Consolidated Freightways	One (1) 10,000-gallon gasoline/diesel UST	TPH	benzene, ethylbenzene, xylene, acenapthene, fluorene, naphthalene, bis (2-ethylhexyl) phthalate
Hall's Fast Motor Freight, Inc.	One (1) 2,000-gallon #2 fuel oil UST, one (1) 4,000-gallon gasoline UST, two (2) 6,000-gallon gasoline UST, one (1) 10,000 gallon #2 fuel oil UST	lead, TPH	benzene, MTBE
Former Shell Station	Gasoline UST tank field, waste oil tank field	none	benzene, ethylbenzene, toluene, xylene, MTBE
South Plainfield Municipal Building	Two (2) gasoline/fuel USTs	none known	benzene, ethylbenzene, toluene, xylene, MTBE
Former Snyder Foundation Property	Two (2) diesel USTs, one (1) gasoline UST	none	benzene

3.1.3 Other Potential Sources

During the NJDEP file review, two separate reports referenced a suspected former landfill located in the floodplain at the confluence of Cedar Brook and Bound Brook. No file records of such a landfill in this area were located during the file search, and, therefore, no details regarding the history or exact location of this landfill are available.

Storm related discharge from the developed properties within the Bound Brook Corridor is conveyed via a common storm sewer system which directs this runoff to discharge outlets located on Bound Brook. Non-point source pollution from diffuse sources in developed areas, as well as potential illegal dumping of oil or other waste materials down the storm drains, may also contribute to the pollutant load to Bound Brook.

An active Conrail railroad right-of-way currently runs parallel to the Bound Brook section of the Bound Brook Corridor. The use of wood preserving chemicals such as creosote in the ties along the track, and the possible historical use of oil for dust control, may contribute contaminants to the soils and sediments of the floodplains, wetlands and Bound Brook.

Review of Sanborn maps did reveal the presence of several properties with industrial histories within the corridor area. Sanborn coverage was available only for the Dunellen section of OU4. Sanborn maps were reviewed from 1919 (1 map sheet), 1927 (2 map sheets), and 1947 (2 map sheets). The majority of the area covered by the maps was residential. There were several companies called by different names throughout the years, located along the Bound Brook, including:

APPENDIX A

ELECTRONIC RECORD TARGET SHEET

SITE NAME:	CORNELL DUBILIER ELECTRONICS, INC.
CERCLIS ID:	NJD981557879
SDMS DOC ID:	200336
ALT. MEDIA TYPE:	ELECTRONIC DOCUMENT
DOCUMENT FORMAT:	CD-ROM
NATIVE FORMAT LOCATION/FILENAME:	APPENDIX A: GIS LAYERS DATA IS NOT A SUPPORTED FILE TYPE
COMMENTS:	FOR INFORMATION CONTACT THE SUPERFUND RECORDS CENTER, 290 BROADWAY, 18TH FLOOR, NYC 10007